



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

**Request For Bids For Construction Services
Two-Stage Bidding Process**

**Stage II – Roofing Contractors Bidders List
Invitation to Bid**

October 31, 2005

**ROOFING IMPROVEMENTS
PROVO JUVENILE COURTS**

**ADMINISTRATIVE OFFICE OF THE COURTS
PROVO, UTAH**

DFCM Project No. 05273150

Scott P. Evans – Architect & Associates
108 West Center Street
Bountiful, Utah 84010

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Current copies of the following documents are hereby made part of these contract documents by reference. These documents are available on the DFCM web site at <http://dfcm.utah.gov> or are available upon request from DFCM:

DFCM General Conditions dated May 25, 2005

DFCM Application and Certificate for Payment dated May 25, 2005

Technical Specifications:

Drawings:

The Agreement and General Conditions dated May 25, 2005 have been updated from versions that were formally adopted and in use prior to this date. The changes made to the General Conditions are identified in a document entitled Revisions to General Conditions that is available on DFCM's web site at <http://dfcm.utah.gov>

INVITATION TO BID

**ONLY CONTRACTORS PREVIOUSLY SHORT-LISTED DURING STAGE I
ARE ALLOWED TO BID ON THIS PROJECT**

The State of Utah - Division of Facilities Construction and Management (DFCM) is requesting bids for the construction of the following project:

ROOFING IMPROVEMENTS – PROVO JUVENILE COURTS
ADMINISTRATIVE OFFICE OF THE COURTS – PROVO, UTAH
DFCM PROJECT NO. 05273150

Removal of existing metal roofing system. Installation of new asphalt shingles with underlayment, new overflow drains and heat cable, new rain gutters, insulation attachment, and metal work as needed.
Construction cost estimate: \$213,800.00.

<u>FIRM NAME</u>	<u>POINT OF CONTACT</u>	<u>PHONE</u>	<u>FAX</u>
All Weather	Mr. Delmar Johnson	(801) 467-4270	(801) 467-3961
Capitol Roofing Service	Mr. Stewart B. Paulsen	(801) 562-5568	(801) 562-1159
Conwest, Inc	Mr. Phil Scarborough	(801) 553-0640	(815) 550-1136
Clark Quality Roofing	Mr. Perry Clark	(801) 266-3575	(801) 266-3692
Dave Atkinson Roofing, Inc.	Mr. Dave Atkinson	(435) 770-4299	(435) 258-2225
Heritage Roofing, LC	Mr. James Smith	(801) 576-8447	(801) 576-8311
Island Heights Construction, Inc	Mr. Terry Cronquist	(435) 753-7403	(435) 753-7452
Kendrick Brothers Roofing, Inc.	Mr. Brad L. Kendrick	(801) 731-2000	(801) 731-2020
Pitt Roofing & Construction, Inc.	Mr. Stacy Galley	(435) 789-6898	(435) 789-2802
Redd Roofing Company	Mr. K. Frank Redd	(801) 621-1363	(801) 621-1540
Summit Roofing & Waterproofing	Mr. Phil Whiting	(801) 529-2596	(801) 732-2186
Superior Roofing and Sheet Metal, Inc	Mr. Blake Redd	(801) 266-1473	(801) 266-1522
Utah Tile and Roofing, Inc	Mr. Paul Seppi	(801) 266-9694	(801) 266-6836

The bid documents will be available at 2:00 PM on Monday, October 31, 2005 electronic format from DFCM at 4110 State Office Building, Salt Lake City, Utah 84114, telephone (801)538-3018 and on the DFCM web page at <http://dfcm.utah.gov>. For questions regarding this project, please contact Wayne Neilson, Project Manager, DFCM, at (801) 209-4048. No others are to be contacted regarding this project.

A **MANDATORY** pre-bid meeting and site visit will be held at 11:30 AM on Tuesday, November 1, 2005 at the Provo Juvenile Courts Building, 1975 South Dakota Lane, Provo, Utah. All short listed prime contractors wishing to bid on this project must attend this meeting.

Bids must be submitted by 3:00 PM on Tuesday, November 8, 2005 to DFCM, 4110 State Office Building, Salt Lake City, Utah 84114. Bids will be opened and read aloud in the DFCM Conference Room, 4110 State Office Building, Salt Lake City, Utah. Note: Bids must be received at 4110 State Office Building by the specified time. The contractor shall comply with and require all of its subcontractors to comply with the license laws as required by the State of Utah.

A bid bond in the amount of five percent (5%) of the bid amount, made payable to the Division of Facilities Construction and Management on DFCM's bid bond form, shall accompany the bid.

The Division of Facilities Construction & Management reserves the right to reject any or all bids or to waive any formality or technicality in any bid in the interest of the State.

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT
MARLA WORKMAN, CONTRACT COORDINATOR
4110 State Office Bldg., Salt Lake City, Utah 84114

STAGE II BIDDING PROCESS

ONLY CONTRACTORS PREVIOUSLY SHORT-LISTED DURING STAGE I ARE ALLOWED TO BID ON THIS PROJECT

1. Invitational Bid Procedures

Invitation to Bid: DFCM will notify each short-listed firm via e-mail and/or fax when a project is ready for construction services.

Bid Documents: Bidding documents including plans and specifications (if applicable) may be obtained by accessing DFCM's web page at <http://dfcm.utah.gov> or at DFCM's office 4110 State Office Building, Salt Lake City, Utah 84114.

Mandatory Pre-Bid Site Meeting: If required, the schedule contained in this document will indicate the date, time, and place of the mandatory pre-bid site meeting. At this meeting, contractors will receive additional instructions about the project and have an opportunity to ask questions about project details. If a firm fails to attend a pre-bid site meeting labeled "Mandatory" they will not be allowed to bid on the project.

Written Questions: The schedule contained in this document will indicate the deadline for submitting questions in writing to the DFCM Representative pertaining to this project.

Final Addendum: The schedule contained in this document will indicate the deadline for DFCM issuing the final addendum clarifying questions and changes to the scope of work. Contractors are responsible for obtaining and responding to information contained in the addenda.

Submitting Bids: Bids must be submitted to DFCM, 4110 State Office Building, Salt Lake City, Utah 84114 by the deadline indicated on the schedule contained in this document. Bids submitted after the deadline will not be accepted. Bids will be opened at DFCM on the date, time, and place indicated on the schedule. (Additional information pertaining to bidding is contained later in this document). It is your responsibility to allow for the time needed to park on Capitol Hill as recent construction activity has made the parking more difficult. Identification is required to enter the building.

Subcontractors List: The firm selected for the project must submit a list of all subcontractors by the deadline indicated on the schedule contained in this document. (Additional information pertaining to subcontractor lists is contained later in this document)

2. Drawings and Specifications, Other Contract Documents

Drawings and Specifications, as well as other available Contract Documents, may be obtained as stated in the Notice to Contractors.

3. **Bids**

Before submitting a bid, each bidder shall carefully examine the Contract Documents; shall visit the site of the Work; shall fully inform themselves as to all existing conditions and limitations; and shall include in the bid the cost of all items required by the Contract Documents. If the bidder observes that portions of the Contract Documents are at variance with applicable laws, building codes, rules, regulations or contain obvious erroneous or uncoordinated information, the bidder shall promptly notify the DFCM Representative and the necessary changes shall be accomplished by Addendum.

The bid, bearing original signatures, must be typed or handwritten in ink on the Bid Form provided in the procurement documents and submitted in a sealed envelope at the location specified by the Notice to Contractor's prior to the published deadline for the submission of bids.

Bid bond security, in the amount of five percent (5%) of the bid, made payable to the Division of Facilities Construction and Management, shall accompany bid. **THE BID BOND MUST BE ON THE BID BOND FORM PROVIDED IN THE PROCUREMENT DOCUMENTS IN ORDER TO BE CONSIDERED AN ACCEPTABLE BID.**

If the bid bond security is submitted on a bid bond form other than the DFCM's required bid bond form, and the bid security meets all other legal requirements, the bidder will be allowed to provide an acceptable bid bond by the close of business on the next business day following notification by DFCM of submission of a defective bid bond security. **Note: A cashier's check cannot be used as a substitute for a bid bond.**

4. **Contract and Bond**

The Contractor's Agreement will be in the form bound in the specifications. The Contract Time will be as indicated in the bid. The successful bidder, simultaneously with the execution of the Contract Agreement, will be required to furnish a performance bond and a payment bond, both bearing original signatures, upon the forms provided in the procurement documents. The performance and payment bonds shall be for an amount equal to one hundred percent (100%) of the Contract Sum and secured from a company that meets the requirements specified in the requisite forms. Any bonding requirements for Subcontractors will be specified in the Supplementary General Conditions.

5. **Listing of Subcontractors**

Listing of Subcontractors shall be as summarized in the “Instructions and Subcontractor’s List Form”, which are included as part of these Contract Documents. The subcontractors list shall be delivered to DFCM or faxed to DFCM at (801)538-3677 within 24 hours of the bid opening. Requirements for listing additional subcontractors will be listed in the Contract Documents.

DFCM retains the right to audit or take other steps necessary to confirm compliance with requirements for the listing and changing of subcontractors. Any contractor who is found to not be in compliance with these requirements is subject to a debarment hearing and may be debarred from consideration for award of contract for a period of up to three years.

6. **Interpretation of Drawings and Specifications**

If any person or entity contemplating submitting a bid is in doubt as to the meaning of any part of the drawings, specifications or other Contract Documents, such person shall submit to the DFCM Representative a request for an interpretation thereof. The person or entity submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by Addenda duly issued and a copy of such Addenda will be mailed or delivered to each person or entity receiving a set of documents. Neither DFCM nor A/E will be responsible for any other explanations or interpretations of the proposed documents. A/E shall be deemed to refer to the architect or engineer hired by DFCM as the A/E or Consultant for the Project.

7. **Addenda**

Any Addenda issued during the time of bidding shall become part of the Contract Documents made available to the bidders for the preparation of the bid, shall be covered in the bid, and shall be made a part of the Contract.

8. **Award of Contract**

The Contract will be awarded as soon as possible to the lowest, responsive and responsible bidder, based on the lowest combination of base bid and acceptable prioritized alternates, provided the bid is reasonable, is in the interests of the State of Utah to accept and after applying the Utah Preference Laws in U.C.A. Title 63, Chapter 56. The DFCM reserves the right to waive any technicalities or formalities in any bid or in the bidding. Alternates will be accepted on a prioritized basis with Alternate 1 being highest priority, Alternate 2 having second priority, etc.

9. **DFCM Contractor Performance Rating**

DFCM will evaluate the performance of the Contractor. This evaluation may include comments from the User. The Contractor will have an opportunity to review and comment on the evaluation. Evaluations, including the Contractor's comments, may be considered in future selection in the evaluation of the Contractor's past performance.

10. **Licensure**

The Contractor shall comply with and require all of its Subcontractors to comply with the license laws as required by the State of Utah.

11. **Right to Reject Bids**

DFCM reserves the right to reject any or all Bids.

12. **Time is of the Essence**

The completion deadline for Sections 1 – 5 is November 30, 2005 with the remainder of the project by May 30, 2006. Failure to meet the completion deadline may result in a poor performance rating from DFCM which may have a negative impact on your firm's ability to obtain future work with the state of Utah and may also result in liquidated damages being assessed. Time is of the essence in regard to all the requirements of the Contract Documents.

13. **Withdrawal of Bids**

Bids may be withdrawn on written request received from bidders within 24 hours after the bid opening if the contractor has made an error in preparing the bid.

14. **Product Approvals**

Where reference is made to one or more proprietary products in the Contract Documents, but restrictive descriptive materials of one or more manufacturer(s) is referred to in the Contract Documents, the products of other manufacturers will be accepted, provided they equal or exceed

the standards set forth in the drawings and specifications and are compatible with the intent and purpose of the design, subject to the written approval of the A/E. Such written approval must occur prior to the deadline established for the last scheduled addenda to be issued. The A/E's written approval will be in an issued Addendum. If the descriptive material is not restrictive, the products of other manufacturers specified will be accepted without prior approval provided they are compatible with the intent and purpose of the design as determined by the A/E.

15. **Financial Responsibility of Contractors, Subcontractors and Sub-subcontractors**

Contractors shall respond promptly to any inquiry in writing by the DFCM to any concern of financial responsibility of the Contractor, Subcontractor or Sub-subcontractor.

16. **Debarment.**

By submitting a bid, the Contractor certifies that neither it nor its principals, including project and site managers, have been, or are under consideration for, debarment or suspension, or any action that would exclude such from participation in a construction contract by any governmental department or agency. If the Contractor cannot certify this statement, attach to the bid a detailed written explanation which must be reviewed and approved by the DFCM as part of the requirements for award of the Project.

**Division of Facilities Construction and Management****PROJECT SCHEDULE**
Stage II = Two-Stage Bidding Process

PROJECT NAME: ROOFING IMPROVEMENTS - PROVO JUVENILE COURTS ADMINISTRATIVE OFFICE OF THE COURTS – PROVO, UTAH				
DFCM PROJECT NO.: 05273150				
Event	Day	Date	Time	Place
Stage II Bidding Documents Available	Monday	October 31, 2005	2:00 PM	DFCM, 4110 State Office Bldg, SLC, UT and DFCM web site *
Mandatory Pre-bid Site Meeting	Tuesday	November 1, 2005	11:30 AM	Provo Juvenile Courts Bldg 1975 South Dakota Lane Provo, UT
Last Day to Submit Questions	Thursday	November 3, 2005	4:00 PM	DFCM, 4110 State Office Bldg, SLC, UT
Final Addendum Issued	Friday	November 4, 2005	4:00 PM	DFCM, 4110 State Office Bldg, SLC, UT or DFCM web site*
Prime Contractors Turn in Bid and Bid Bond / Bid Opening in DFCM Conference Room	Tuesday	November 8, 2005	3:00 PM	DFCM, 4110 State Office Bldg, SLC, UT
Subcontractors List Due	Wednesday	November 9, 2005	3:00 PM	DFCM, 4110 State Office Bldg, SLC, UT
Project Completion Date	Tuesday	May 30, 2006		

* DFCM's web site address is <http://dfcm.utah.gov>



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

BID FORM

NAME OF BIDDER _____ DATE _____

To the Division of Facilities Construction and Management
4110 State Office Building
Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the Request for Bids for the **ROOFING IMPROVEMENTS- PROVO JUVENILE COURTS – ADMINISTRATIVE OFFICE OF THE COURTS – PROVO, UTAH - DFCM PROJECT NO. 05273150** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: _____

For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

_____ DOLLARS (\$_____) (In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete by **May 30, 2006** after receipt of the Notice to Proceed, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **\$100.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of _____

The undersigned Contractor's License Number for Utah is _____.

BID FORM
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Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract. The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable 100% Performance and Payment bonds are not delivered within time set forth.

Type of Organization: _____
(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

Respectfully submitted,

Name of Bidder

ADDRESS:

Authorized Signature

BID BOND

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

That _____ hereinafter referred to as the "Principal," and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed, (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the STATE OF UTAH, hereinafter referred to as the "Obligee," in the amount of \$ _____ (5% of the accompanying bid), being the sum of this Bond to which payment the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted to Obligee the accompanying bid incorporated by reference herein, dated as shown, to enter into a contract in writing for the _____ Project.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that if the said principal does not execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the principal, then the sum of the amount stated above will be forfeited to the State of Utah as liquidated damages and not as a penalty; if the said principal shall execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the Principal, then this obligation shall be null and void. It is expressly understood and agreed that the liability of the Surety for any and all defaults of the Principal hereunder shall be the full penal sum of this Bond. The Surety, for value received, hereby stipulates and agrees that obligations of the Surety under this Bond shall be for a term of sixty (60) days from actual date of the bid opening.

PROVIDED, HOWEVER, that this Bond is executed pursuant to provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals on the date indicated below, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

DATED this _____ day of _____, 20____.

Principal's name and address (if other than a corporation):

By: _____

Title: _____

Principal's name and address (if a corporation):

By: _____

Title: _____
(Affix Corporate Seal)

Surety's name and address:

By: _____
Attorney-in-Fact (Affix Corporate Seal)

STATE OF _____)
COUNTY OF _____) ss.

On this ____ day of _____, 20____, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20____.

My Commission Expires: _____

Resides at: _____

Agency: _____
Agent: _____
Address: _____
Phone: _____

NOTARY PUBLIC

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

**Division of Facilities Construction and Management****INSTRUCTION AND SUBCONTRACTORS LIST FORM**

The three low bidders, as well as all other bidders that desire to be considered, are required by law to submit to DFCM within 24 hours of bid opening a list of **ALL** first-tier subcontractors, including the subcontractor's name, bid amount and other information required by Building Board Rule and as stated in these Contract Documents, on the following basis:

PROJECTS UNDER \$500,000 - ALL SUBS \$20,000 OR OVER MUST BE LISTED
PROJECTS \$500,000 OR MORE - ALL SUBS \$35,000 OR OVER MUST BE LISTED

- Any additional subcontractors identified in the bid documents shall also be listed.
- The DFCM Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law.
- List subcontractors for base bid as well as the impact on the list that the selection of any alternate may have.
- Bidder may not list more than one subcontractor to perform the same work.
- Bidder must list "Self" if performing work itself.

LICENSURE:

The subcontractor's name, the type of work, the subcontractor's bid amount, and the subcontractor's license number as issued by DOPL, if such license is required under Utah Law, shall be listed. Bidder shall certify that all subcontractors, required to be licensed, are licensed as required by State law. A subcontractor includes a trade contractor or specialty contractor and does not include suppliers who provide only materials, equipment, or supplies to a contractor or subcontractor.

BIDDER LISTING 'SELF' AS PERFORMING THE WORK:

Any bidder that is properly licensed for the particular work and intends to perform that work itself in lieu of a subcontractor that would otherwise be required to be on the subcontractor list, must insert the term 'Self' for that category on the subcontractor list form. Any listing of 'Self' on the sublist form shall also include the amount allocated for that work.

'SPECIAL EXCEPTION':

A bidder may list 'Special Exception' in place of a subcontractor when the bidder intends to obtain a subcontractor to perform the work at a later date because the bidder was unable to obtain a qualified or reasonable bid under the provisions of U.C.A. Section 63A-5-208(4). The bidder shall insert the term 'Special Exception' for that category of work, and shall provide documentation with the subcontractor list describing the bidder's efforts to obtain a bid of a qualified subcontractor at a reasonable cost and why the bidder was unable to obtain a qualified subcontractor bid. The Director must find that the bidder complied in good faith with State law requirements for any 'Special Exception' designation, in order for the bid to be considered. If awarded the contract, the Director shall supervise the bidder's efforts to obtain a qualified subcontractor bid. The amount of the awarded contract may not be adjusted to reflect the actual amount of the subcontractor's bid. Any listing of 'Special Exception' on the sublist form shall also include amount allocated for that work.

INSTRUCTIONS AND SUBCONTRACTORS LIST FORM
Page No. 2

GROUND FOR DISQUALIFICATION:

The Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law. Director may withhold awarding the contract to a particular bidder if one or more of the proposed subcontractors are considered by the Director to be unqualified to do the Work or for such other reason in the best interest of the State of Utah. Notwithstanding any other provision in these instructions, if there is a good faith error on the sublist form, at the sole discretion of the Director, the Director may provide notice to the contractor and the contractor shall have 24 hours to submit the correction to the Director. If such correction is submitted timely, then the sublist requirements shall be considered met.

CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:

Subsequent to twenty-four hours after the bid opening, the contractor may change its listed subcontractors only after receiving written permission from the Director based on complying with all of the following criteria.

- (1) The contractor has established in writing that the change is in the best interest of the State and that the contractor establishes an appropriate reason for the change, which may include, but not is not limited to, the following reasons: the original subcontractor has failed to perform, or is not qualified or capable of performing, and/or the subcontractor has requested in writing to be released.
- (2) The circumstances related to the request for the change do not indicate any bad faith in the original listing of the subcontractors.
- (3) Any requirement set forth by the Director to ensure that the process used to select a new subcontractor does not give rise to bid shopping.
- (4) Any increase in the cost of the subject subcontractor work is borne by the contractor.
- (5) Any decrease in the cost of the subject subcontractor work shall result in a deductive change order being issued for the contract for such decreased amount.
- (6) The Director will give substantial weight to whether the subcontractor has consented in writing to being removed unless the Contractor establishes that the subcontractor is not qualified for the work.

EXAMPLE:

Example of a list where there are only four subcontractors:

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONT. LICENSE #
ELECTRICAL	ABCD Electric Inc.	\$350,000.00	123456789000
LANDSCAPING	"Self"	300,000.00	123456789000
CONCRETE (ALTERNATE #1)	XYZ Concrete Inc	298,000.00	987654321000
MECHANICAL	"Special Exception" (attach documentation)	Fixed at: 350,000.00	(TO BE PROVIDED AFTER OBTAINING SUBCONTRACTOR)

**PURSUANT TO STATE LAW - SUBCONTRACTOR BID AMOUNTS CONTAINED IN THIS
SUBCONTRACTOR LIST SHALL NOT BE DISCLOSED UNTIL THE CONTRACT HAS BEEN AWARDED.**

**Division of Facilities Construction and Management****SUBCONTRACTORS LIST****PROJECT TITLE:** _____**Caution:** You must read and comply fully with instructions.

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONT. LICENSE #

We certify that:

1. This list includes all subcontractors as required by the instructions, including those related to the base bid as well as any alternates.
2. We have listed "Self" or "Special Exception" in accordance with the instructions.
3. All subcontractors are appropriately licensed as required by State law.

FIRM: _____

DATE: _____

SIGNED BY: _____

NOTICE: FAILURE TO SUBMIT THIS FORM, PROPERLY COMPLETED AND SIGNED, AS REQUIRED IN THESE CONTRACT DOCUMENTS, SHALL BE GROUNDS FOR DFCMS REFUSAL TO ENTER INTO A WRITTEN CONTRACT WITH BIDDER. ACTION MAY BE TAKEN AGAINST BIDDERS BID BOND AS DEEMED APPROPRIATE BY DFCM. ATTACH A SECOND PAGE IF NECESSARY.

FUGITIVE DUST PLAN

The Contractor will fill out the form and file the original with the Division of Air Quality and a copy of the form with the Division of Facilities Construction & Management, prior to the issuance of any notice to proceed.

The Contractor will be fully responsible for compliance with the Fugitive Dust Control Plan, including the adequacy of the plan, any damages, fines, liability, and penalty or other action that results from noncompliance.

Utah Division of Air Quality

April 20, 1999

**GUIDANCE THAT MUST BE CONSIDERED IN DEVELOPING AND SUBMITTING A
DUST CONTROL PLAN FOR COMPLIANCE WITH R307-309-3, 4, 5, 6, 7**

Source Information:

1. Name of your operation (source): provide a name if the source is a construction site.
2. Address or location of your operation or construction site.
3. UTM coordinates or Longitude/Latitude of stationary emission points at your operation.
4. Lengths of the project, if temporary (time period).
5. Description of process (include all sources of dust and fugitive dust). Please, if necessary, use additional sheets of paper for this description. Be sure to mark it as an attachment.
6. Type of material processed or disturbed.
7. Amount of material processed (tons per year, tons per month, lbs./hr., and applicable units).

8. Destination of product (where will the material produced be used or transported, be specific, provide address or specific location), information needed for temporary relocation applicants.
9. Identify the individual who is responsible for the implementation and maintenance of fugitive dust control measures. List name(s), position(s) and telephone number(s).
10. List, and attach copies of any contract lease, liability agreement with other companies that may, or will, be responsible for dust control on site or on the project.

Description of Fugitive Dust Emission Activities
(Things to consider in addressing fugitive dust control strategies.)

1. Type of activities (drilling and blasting, road construction, development construction, earth moving and excavation, handling and hauling materials, cleaning and leveling, etc).
2. List type of equipment generating the fugitive dust.
3. Diagram the location of each activity or piece of equipment on site. Please attach the diagram.
4. Provide pictures or drawings of each activity. Include a drawing of the unpaved/paved road network used to move loads “on” and “off” property.
5. Vehicle miles travels on unpaved roads associated with the activity (average speed).
6. Type of dust emitted at each source (coal, cement, sand, soil, clay, dust, etc.)
7. Estimate the size of the release area at which the activity occurs (square miles). For haul or dirt roads include total miles of road in use during the activity.

Description of Fugitive Dust Emission Controls on Site

Control strategies must be designed to meet 20% opacity or less on site (a lesser opacity may be defined by Approval Order conditions or federal requirements such as NSPS), and control strategies must prevent exceeding 10% opacity from fugitive dust at the property boundary (site boundary) for compliance with R307-309-3.

1. Types of ongoing emission controls proposed for each activity, each piece of equipment, and haul roads.
2. Types of additional dust controls proposed for bare, exposed surfaces (chemical stabilization, synthetic cover, wind breaks, vegetative cover, etc).
3. Method of application of dust suppressant.
4. Frequency of application of dust suppressant.
5. Explain what triggers the use of a special control measure other than routine measures already in place, such as covered loads or measures covered by a permit condition (increase in opacity, high winds, citizen complaints, dry conditions, etc).
6. Explain in detail what control strategies/measures will be implemented off-hours, i.e., Saturdays/Sundays/Holidays, as well as 6 PM to 6 AM each day.

Description of Fugitive Dust Control Off-site

Prevent, to the maximum extent possible, deposition of materials, which may create fugitive dust on public and private paved roads in compliance with R307-309-5, 6, 7.

1. Types of emission controls initiated by your operation that are in place “off” property (application of water, covered loads, sweeping roads, vehicle cleaning, etc.).

2. Proposed remedial controls that will be initiated promptly if materials, which may create fugitive dust, are deposited on public and private paved roads.

Submit the Dust Control Plan to:

Executive Secretary
Utah Air Quality Board
POB 144820
15 North 1950 West
Salt Lake City, Utah 84114-4820

Phone: (801) 536-4000
FAX: (801) 536-4099

Fugitive Dust Control Plan Violation Report

When a source is found in violation of R307-309-3 or in violation of the Fugitive Dust Control Plan, the source must submit a report to the Executive Secretary within 15 days after receiving a Notice of Violation. The report must include the following information:

1. Name and address of dust source.
2. Time and duration of dust episode.
3. Meteorological conditions during the dust episode.
4. Total number and type of fugitive dust activities and dust producing equipment within each operation boundary. If no change has occurred from the existing dust control plan, the source should state that the activity/equipment is the same.
5. Fugitive dust activities or dust producing equipment that caused a violation of R-307-309-3 or the source's dust control plan.
6. Reasons for failing to control dust from the dust generating activity or equipment.
7. New and/or additional fugitive dust control strategies necessary to achieve compliance with R307-309-3, 4, 5, 6, or 7.
8. If it can not be demonstrated that the current approved Dust Control Plan can result in compliance with R307-309-3 through 7, the Dust Control Plan must be revised so as to demonstrate compliance with 307-309-3 through 7. Within 30 days of receiving a fugitive dust Notice of Violation, the source must submit the revised Plan to the Executive Secretary for review and approval.

Submit the Dust Control Plan to:

Executive Secretary	Phone: (801) 536-4000
Utah Air Quality Board	FAX: (801) 536-4099
POB 144820	
15 North 1950 West	
Salt Lake City, Utah 84114-4820	

Attachments: DFCM Form FDR R-307-309, Rule 307-309

CONTRACTOR'S AGREEMENT

FOR:

THIS CONTRACTOR'S AGREEMENT, made and entered into this ____ day of _____, 20__, by and between the DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT, hereinafter referred to as "DFCM", and _____, incorporated in the State of _____ and authorized to do business in the State of Utah, hereinafter referred to as "Contractor", whose address is _____.

WITNESSETH: WHEREAS, DFCM intends to have Work performed at _____
_____.

WHEREAS, Contractor agrees to perform the Work for the sum stated herein.

NOW, THEREFORE, DFCM and Contractor for the consideration provided in this Contractor's Agreement, agree as follows:

ARTICLE 1. SCOPE OF WORK. The Work to be performed shall be in accordance with the Contract Documents prepared by _____ and entitled "_____
_____."

The DFCM General Conditions ("General Conditions") dated May 25, 2005 on file at the office of DFCM and available on the DFCM website, are hereby incorporated by reference as part of this Agreement and are included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

The Contractor Agrees to furnish labor, materials and equipment to complete the Work as required in the Contract Documents which are hereby incorporated by reference. It is understood and agreed by the parties hereto that all Work shall be performed as required in the Contract Documents and shall be subject to inspection and approval of DFCM or its authorized representative. The relationship of the Contractor to the DFCM hereunder is that of an independent Contractor.

ARTICLE 2. CONTRACT SUM. The DFCM agrees to pay and the Contractor agrees to accept in full performance of this Contractor's Agreement, the sum of _____ DOLLARS AND NO CENTS (\$_____.00), which is the base bid, and which sum also includes the cost of a 100%

CONTRACTOR'S AGREEMENT
PAGE NO. 2

Performance Bond and a 100% Payment Bond as well as all insurance requirements of the Contractor. Said bonds have already been posted by the Contractor pursuant to State law. The required proof of insurance certificates have been delivered to DFCM in accordance with the General Conditions before the execution of this Contractor's Agreement.

ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY. The Work shall be Substantially Complete within _____ (____) calendar days after the date of the Notice to Proceed. Contractor agrees to pay liquidated damages in the amount of \$_____ per day for each day after expiration of the Contract Time until the Contractor achieves Substantial Completion in accordance with the Contract Documents, if Contractor's delay makes the damages applicable. The provision for liquidated damages is: (a) to compensate the DFCM for delay only; (b) is provided for herein because actual damages can not be readily ascertained at the time of execution of this Contractor's Agreement; (c) is not a penalty; and (d) shall not prevent the DFCM from maintaining Claims for other non-delay damages, such as costs to complete or remedy defective Work.

No action shall be maintained by the Contractor, including its or Subcontractor or suppliers at any tier, against the DFCM or State of Utah for damages or other claims due to losses attributable to hindrances or delays from any cause whatsoever, including acts and omissions of the DFCM or its officers, employees or agents, except as expressly provided in the General Conditions. The Contractor may receive a written extension of time, signed by the DFCM, in which to complete the Work under this Contractor's Agreement in accordance with the General Conditions.

ARTICLE 4. CONTRACT DOCUMENTS. The Contract Documents consist of this Contractor's Agreement, the Conditions of the Contract (DFCM General Conditions, Supplementary and other Conditions), the Drawings, Specifications, Addenda and Modifications. The Contract Documents shall also include the bidding documents, including the Notice to Contractors, Instructions to Bidders/Proposers and the Bid/Proposal, to the extent not in conflict therewith and other documents and oral presentations that are documented as an attachment to the contract.

All such documents are hereby incorporated by reference herein. Any reference in this Contractor's Agreement to certain provisions of the Contract Documents shall in no way be construed as to lessen the importance or applicability of any other provisions of the Contract Documents.

ARTICLE 5. PAYMENT. The DFCM agrees to pay the Contractor from time to time as the Work progresses, but not more than once each month after the date of Notice to Proceed, and only upon Certificate of the A/E for Work performed during the preceding calendar month, ninety-five percent (95%) of the value of the labor performed and ninety-five percent (95%) of the value of materials furnished in place or on the site. The Contractor agrees to furnish to the DFCM invoices for materials purchased and on the site but not installed, for which the

CONTRACTOR'S AGREEMENT
PAGE NO. 3

Contractor requests payment and agrees to safeguard and protect such equipment or materials and is responsible for safekeeping thereof and if such be stolen, lost or destroyed, to replace same.

Such evidence of labor performed and materials furnished as the DFCM may reasonably require shall be supplied by the Contractor at the time of request for Certificate of Payment on account. Materials for which payment has been made cannot be removed from the job site without DFCM's written approval. Five percent (5%) of the earned amount shall be retained from each monthly payment. The retainage, including any additional retainage imposed and the release of any retainage, shall be in accordance with UCA 13-8-5 as amended. Contractor shall also comply with the requirements of UCA 13-8-5, including restrictions of retainage regarding subcontractors and the distribution of interest earned on the retention proceeds. The DFCM shall not be responsible for enforcing the Contractor's obligations under State law in fulfilling the retention law requirements with subcontractors at any tier.

ARTICLE 6. INDEBTEDNESS. Before final payment is made, the Contractor must submit evidence satisfactory to the DFCM that all payrolls, materials bills, subcontracts at any tier and outstanding indebtedness in connection with the Work have been properly paid. Final Payment will be made after receipt of said evidence, final acceptance of the Work by the DFCM as well as compliance with the applicable provisions of the General Conditions.

Contractor shall respond immediately to any inquiry in writing by DFCM as to any concern of financial responsibility and DFCM reserves the right to request any waivers, releases or bonds from Contractor in regard to any rights of Subcontractors (including suppliers) at any tier or any third parties prior to any payment by DFCM to Contractor.

ARTICLE 7. ADDITIONAL WORK. It is understood and agreed by the parties hereto that no money will be paid to the Contractor for additional labor or materials furnished unless a new contract in writing or a Modification hereof in accordance with the General Conditions and the Contract Documents for such additional labor or materials has been executed. The DFCM specifically reserves the right to modify or amend this Contractor's Agreement and the total sum due hereunder either by enlarging or restricting the scope of the Work.

ARTICLE 8. INSPECTIONS. The Work shall be inspected for acceptance in accordance with the General Conditions.

ARTICLE 9. DISPUTES. Any dispute, PRE or Claim between the parties shall be subject to the provisions of Article 7 of the General Conditions. DFCM reserves all rights to pursue its rights and remedies as provided in the General Conditions.

ARTICLE 10. TERMINATION, SUSPENSION OR ABANDONMENT. This Contractor's Agreement may be terminated, suspended or abandoned in accordance with the General Conditions.

ARTICLE 11. DFCM'S RIGHT TO WITHHOLD CERTAIN AMOUNT AND MAKE USE THEREOF. The DFCM may withhold from payment to the Contractor such amount as, in DFCM's judgment, may be necessary to pay just claims against the Contractor or Subcontractor at any tier for labor and services rendered and materials furnished in and about the Work. The DFCM may apply such withheld amounts for the payment of such claims in DFCM's discretion. In so doing, the DFCM shall be deemed the agent of Contractor and payment so made by the DFCM shall be considered as payment made under this Contractor's Agreement by the DFCM to the Contractor. DFCM shall not be liable to the Contractor for any such payment made in good faith. Such withholdings and payments may be made without prior approval of the Contractor and may be also be prior to any determination as a result of any dispute, PRE, Claim or litigation.

ARTICLE 12. INDEMNIFICATION. The Contractor shall comply with the indemnification provisions of the General Conditions.

ARTICLE 13. SUCCESSORS AND ASSIGNMENT OF CONTRACT. The DFCM and Contractor, respectively bind themselves, their partners, successors, assigns and legal representatives to the other party to this Agreement, and to partners, successors, assigns and legal representatives of such other party with respect to all covenants, provisions, rights and responsibilities of this Contractor's Agreement. The Contractor shall not assign this Contractor's Agreement without the prior written consent of the DFCM, nor shall the Contractor assign any moneys due or to become due as well as any rights under this Contractor's Agreement, without prior written consent of the DFCM.

ARTICLE 14. RELATIONSHIP OF THE PARTIES. The Contractor accepts the relationship of trust and confidence established by this Contractor's Agreement and covenants with the DFCM to cooperate with the DFCM and A/E and use the Contractor's best skill, efforts and judgment in furthering the interest of the DFCM; to furnish efficient business administration and supervision; to make best efforts to furnish at all times an adequate supply of workers and materials; and to perform the Work in the best and most expeditious and economic manner consistent with the interests of the DFCM.

ARTICLE 15. AUTHORITY TO EXECUTE AND PERFORM AGREEMENT. Contractor and DFCM each represent that the execution of this Contractor's Agreement and the performance thereunder is within their respective duly authorized powers.

ARTICLE 16. ATTORNEY FEES AND COSTS. Except as otherwise provided in the dispute resolution provisions of the General Conditions, the prevailing party shall be entitled to reasonable attorney fees and costs incurred in any action in the District Court and/or appellate body to enforce this Contractor's Agreement or recover damages or any other action as a result of a breach thereof.

CONTRACTOR'S AGREEMENT
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IN WITNESS WHEREOF, the parties hereto have executed this Contractor's Agreement on the day and year stated hereinabove.

CONTRACTOR: _____

Signature Date

Title: _____

State of _____)
County of _____)

Please type/print name clearly

On this ____ day of _____, 20____, personally appeared before me, _____, whose identity is personally known to me (or proved to me on the basis of satisfactory evidence) and who by me duly sworn (or affirmed), did say that he (she) is the _____ (title or office) of the firm and that said document was signed by him (her) in behalf of said firm.

(SEAL)

Notary Public

My Commission Expires _____

APPROVED AS TO AVAILABILITY
OF FUNDS:

Financial Manager, Date
Division of Facilities Construction
and Management

**DIVISION OF FACILITIES
CONSTRUCTION AND MANAGEMENT**

Manager - Date
Capital _____

APPROVED AS TO FORM:
ATTORNEY GENERAL
May 25, 2005
By: Alan S. Bachman
Asst Attorney General

APPROVED FOR EXPENDITURE:

Division of Finance Date

PERFORMANCE BOND
(Title 63, Chapter 56, U. C. A. 1953, as Amended)

That _____ hereinafter referred to as the "Principal" and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah, hereinafter referred to as the "Obligee," in the amount of _____ DOLLARS (\$ _____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____, for the approximate sum of _____ Dollars (\$ _____), which Contract is hereby incorporated by reference herein.

NOW, THEREFORE, the condition of this obligation is such that if the said Principal shall faithfully perform the Contract in accordance with the Contract Documents including, but not limited to, the Plans, Specifications and conditions thereof, the one year performance warranty, and the terms of the Contract as said Contract may be subject to Modifications or changes, then this obligation shall be void; otherwise it shall remain in full force and effect.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the state named herein or the heirs, executors, administrators or successors of the Owner.

The parties agree that the dispute provisions provided in the Contract Documents apply and shall constitute the sole dispute procedures of the parties.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the Provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20____.

WITNESS OR ATTESTATION:

PRINCIPAL:

By: _____
(Seal)

Title: _____

WITNESS OR ATTESTATION:

SURETY:

By: _____
Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20____, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney in-fact of the above-named Surety Company and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20____.

My commission expires: _____

Resides at: _____

NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General
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PAYMENT BOND

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

That _____ hereinafter referred to as the "Principal," and _____, a corporation organized and existing under the laws of the State of _____ authorized to do business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); with its principal office in the City of _____, hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah hereinafter referred to as the "Obligee," in the amount of _____ Dollars (\$ _____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____ for the approximate sum of _____ Dollars (\$ _____), which contract is hereby incorporated by reference herein.

NOW, THEREFORE, the condition of this obligation is such that if the said Principal shall pay all claimants supplying labor or materials to Principal or Principal's Subcontractors in compliance with the provisions of Title 63, Chapter 56, of Utah Code Annotated, 1953, as amended, and in the prosecution of the Work provided for in said Contract, then, this obligation shall be void; otherwise it shall remain in full force and effect.

That said Surety to this Bond, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the Contract or to the Work to be performed thereunder, or the specifications or drawings accompanying same shall in any way affect its obligation on this Bond, and does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to the Work or to the specifications or drawings and agrees that they shall become part of the Contract Documents.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20____.

WITNESS OR ATTESTATION:

PRINCIPAL:

By: _____ (Seal)

Title: _____

WITNESS OR ATTESTATION:

SURETY:

By: _____ Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20____, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20____.

My commission expires: _____

Resides at: _____

NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

**Division of Facilities Construction and Management****CHANGE ORDER # _____**

CONTRACTOR: _____

AGENCY OR INSTITUTION: _____

PROJECT NAME: _____

PROJECT NUMBER: _____

CONTRACT NUMBER: _____

ARCHITECT: _____

DATE: _____

CONSTRUCTION CHANGE DIRECTIVE NO.	PROPOSAL REQUEST NO.	AMOUNT		DAYS	
		INCREASE	DECREASE	INCREASE	DECREASE

	Amount	Days	Date
ORIGINAL CONTRACT			
TOTAL PREVIOUS CHANGE ORDERS			
TOTAL THIS CHANGE ORDER			
ADJUSTED CONTRACT			

DFCM and Contractor agree that the terms, contract sum, scope of the Work and time specified in this Change Order shall constitute the full accord and satisfaction, and complete adjustment to the Contract and includes all direct and indirect costs and effects related to, incidental to, and/or reasonably implied from such change in the contract terms, sum, scope of the Work and time.

Contractor: _____

Date

Architect/Engineer: _____

Date

Agency or Institution: _____

Date

DFCM: _____

Date

Funding Verification: _____

Date

**Division of Facilities Construction and Management****CERTIFICATE OF SUBSTANTIAL COMPLETION**

PROJECT _____ PROJECT NO: _____

AGENCY/INSTITUTION _____

AREA ACCEPTED _____

The Work performed under the subject Contract has been reviewed on this date and found to be Substantially Completed as defined in the General Conditions; including that the construction is sufficiently completed in accordance with the Contract Documents, as modified by any change orders agreed to by the parties, so that the State of Utah can occupy the Project or specified area of the Project for the use for which it is intended.

The DFCM accepts the Project or specified area of the Project as Substantially Complete and will assume full possession of the Project or specified area of the Project at _____ (time) on _____ (date).

The DFCM accepts the Project for occupancy and agrees to assume full responsibility for maintenance and operation, including utilities and insurance, of the Project subject to the itemized responsibilities and/or exceptions noted below:

A list of items to be completed or corrected is attached hereto. The failure to include an item on it does not alter the responsibility of the Contractor to complete all the Work in accordance with the Contract Documents, including authorized changes thereof.

The Contractor shall complete or correct the Work on the list of items appended hereto within _____ calendar days from the above date of issuance of this Certificate. The amount withheld pending completion of the list of items noted and agreed to shall be: \$_____.

CONTRACTOR (include name of firm) by: _____ DATE

A/E by: _____ DATE

USING INSTITUTION OR AGENCY by: _____ DATE

DFCM by: _____ DATE

cc: Parties Noted
DFCM, Director

PROJECT MANUAL

2005 REROOF TO: PROVO 4TH DISTRICT JUVENILE COURT

2021 SOUTH STATE STREET
PROVO, UTAH 84606

October 28, 2005
DFCM PROJECT NO. -- 05273150



State of Utah—Department of Administrative Services

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT

4110 State Office Building / Salt Lake City, Utah 84114 / 538-3018



"Our Success Is Measured By The Level Of Our Client's Success".

SCOTT P. EVANS – ARCHITECT & ASSOCIATES P.C.

108 West Center Street, Bountiful, Utah 84010
Phone 801-298-1368 Fax 801-298-2192 spevans@qwest.net

CONSULTANTS

ARCHITECT

Scott P. Evans – Architect and Associates P.C.
108 West Center Street
Bountiful, Utah 84010
(801) 298-1368
Fax (801) 298-2192

MECHANICAL ENGINEER

Van Boerum & Frank Associates Inc. Consulting Engineers
330 South 300 East
Salt Lake City, Utah 84111
(801) 530-3148
Fax (801) 530-3150

ELECTRICAL ENGINEER

Thomas and Kolkman Engineering Inc.
64 West 1700 South
Salt lake City, Utah 84115
(801) 484-8161
(801) 484-3538

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SECTION 01100 – SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Work covered by the Contract Documents.
- 2. Type of the Contract.
- 3. Use of premises.
- 4. Owner's occupancy requirements.
- 5. Work restrictions.
- 6. Specification formats and conventions.

- B. Related Sections include the following:

- 1. Division 1 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Utah National Guard

2005 Reroof To: Provo 4th District Juvenile Court
DFCM Number: 05273150

- 1. Project Location: 2021 South State Street, Provo, Utah 84606

- B. Owner: State of Utah
Division of Facilities Construction Management
4110 State Office Building
Salt Lake City, Utah 84114

- 1. Owner's Representative: Wayne Neilson

- C. Owner's Agency: ADMINISTRATIVE OFFICE OF THE COURTS
450 South State Street
Salt Lake City, Utah 84114-0241

- D. Agency's Representative: Paul Platt

- E. Architect: Scott P. Evans – Architect & Associates P.C.
108 West Center St.
Bountiful, Utah 84010

F. The Work consists of the following:

1. Removal of all existing metal roofing and metal fascia.
2. New asphalt roofing.
3. New metal gutters around perimeter of roof and downspouts.
4. New Roof EIFS fascia and color refinish of existing EIFS soffit.
5. New Skylights.
6. New Secondary drains
7. New heat cable at rain gutters and valleys as shown.
8. New metal roof ladders.
9. Building Insulation at selected locations.
10. New Underground rain gutter lines to existing storm drain lines
11. Remove and replace existing sidewalks for underground rainwater lines
12. Remove and replace existing asphalt in areas affected by new underground pipe for rainwater lines connected to existing.

1.4 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract.

1.5 USE OF PREMISES

- A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

1.6 WORK RESTRICTIONS

1. See Owner's RFP document for special restrictions.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Owner not less than two days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Owner's written permission.

1.7 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.
1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred, as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01140 - WORK RESTRICTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to areas of remodeling only.
 - 2. Owner Occupancy: Allow for Owner occupancy of site and use by the public.
 - 3. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.3 OCCUPANCY REQUIREMENTS

- A. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.
- B. Partial Owner Occupancy: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will provide, operate, and maintain mechanical and electrical systems serving occupied portions of building.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01140

SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
 - 1. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250

SECTION 01290 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Contractor's Construction Schedule.
 - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.

- b. Name of Architect.
 - c. Contractor's name and address.
 - d. Date of submittal.
- 2. Submit draft of AIA Document G703 Continuation Sheets.
- 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
- 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
- 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- 7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
- 8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 2 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Submittals Schedule (preliminary if not final).
- G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
- B. Related Sections include the following:
 - 1. Division 1 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
 - 2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, which depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
 9. Project closeout activities.

1.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequences.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit two opaque copies of each submittal. Architect will return one copy.
 - a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.
 4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
- B. Key Personnel Names: Within 3 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.
- C. Security Background Checks: If requested by the Owner, all construction workers must provide the following for a security background check: Date of Birth, Driver License Number, and Social Security Number.

1.5 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 3 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for requests for interpretations (RFIs).
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Preparation of Record Documents.
 - l. Use of the premises and existing building.
 - m. Work restrictions.
 - n. Owner's occupancy requirements.
 - o. Responsibility for temporary facilities and controls.
 - p. Construction waste management and recycling.
 - q. Parking availability.
 - r. Office, work, and storage areas.
 - s. Equipment deliveries and priorities.
 - t. First aid.
 - u. Security.
 - v. Progress cleaning.
 - w. Working hours.
 3. Minutes: Architect will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related requests for interpretations (RFIs).
 - d. Related Change Orders.
 - e. Submittals.
 - f. Review of mockups.
 - g. Possible conflicts.
 - h. Compatibility problems.
 - i. Time schedules.
 - j. Manufacturer's written recommendations.
 - k. Warranty requirements.
 - l. Compatibility of materials.
 - m. Acceptability of substrates.
 - n. Installation procedures.
 - o. Coordination with other work.
 - p. Required performance results.
 - q. Protection of adjacent work.
 - r. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Off-site fabrication.

- 5) Site utilization.
 - 6) Work hours.
 - 7) Hazards and risks.
 - 8) Progress cleaning.
 - 9) Quality and work standards.
 - 10) Status of correction of deficient items.
 - 11) Field observations.
 - 12) Requests for interpretations (RFIs).
 - 13) Status of proposal requests.
 - 14) Pending changes.
 - 15) Status of Change Orders.
 - 16) Pending claims and disputes.
 - 17) Documentation of information for payment requests.
3. Minutes: Architect will record and distribute to Contractor the meeting minutes.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Preliminary Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Submittals Schedule.
 - 4. Special reports.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
 - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.
 - 4. Division 1 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

- A. Submittals Schedule: Submit six copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for Architect's final release or approval.
- B. Preliminary Construction Schedule: Submit six opaque copies.
- C. Contractor's Construction Schedule: Submit six opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
- D. CPM Reports or Bar Chart Reports: Concurrent with CPM schedule or Bar Chart Reports, submit six copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
- E. Special Reports: Submit four copies at time of unusual event.

1.4 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 1. Secure time commitments for performing critical elements of the Work from parties involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - a. At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 5 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. Insert list of major items or pieces of equipment.
 3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 4. Startup and Testing Time: Include not less than 5 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 1 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion
- F. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- G. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.

- B. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, time-scaled CPM network analysis diagram for the Work.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Installation.
 - c. Work by Owner that may affect or be affected by Contractor's activities.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- D. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Principal events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the Schedule of Values).
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.
- F. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
 3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.

4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.

2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01320

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
 - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
 - 3. Division 1 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
 - 4. Division 1 Section "Closeout Procedures" for submitting warranties.
 - 5. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 6. Division 1 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 7. Division 1 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
 - 8. Divisions 2 through 16 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. General: Architect will not provide electronic copies of CAD Drawings of the Contract Drawings for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that requires sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Insert list of submittals below requiring sequential review, or delete and identify submittals in Sections where they are specified. Structural, mechanical, plumbing, and electrical components are examples of the Work that often require sequential review.
 6. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- E. Identification: Place a permanent label or title block on each submittal for identification.
 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.

- F. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
 2. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
1. Transmittal Form: Use AIA Document G810.
 2. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.
 - j. Transmittal number, numbered consecutively.
 - k. Submittal and transmittal distribution record.
 - l. Remarks.
 - m. Signature of transmitter.
 3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, and authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with mark by Architect.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
1. Submit electronic submittals directly to extranet specifically established for Project.

- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 4. Submit Product Data before or concurrent with Samples.
 5. Number of Copies: Submit **six** copies of Product Data, unless otherwise indicated. Architect will return three (minimum) copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit **six** opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit six copies where copies are required for operation

and maintenance manuals. Architect will retain three (minimum) copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.
4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect will return two copies.

a. Mark up and retain one returned copy as a Project Record Document.

- F. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation" for Construction Manager's action.
- G. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- H. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."
- I. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."
- J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return two copies.

a. Mark up and retain one returned copy as a Project Record Document.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. An officer shall sign certificates and certifications or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."
- B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- M. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."
- N. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- O. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- P. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

- Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."
- R. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- T. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- U. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- V. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.
1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

2.3 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each

product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S / ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01330

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 2. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

- E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

- A. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.

7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- G. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect three days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow three days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within seven days of date established for the Notice to Proceed.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by a qualified testing agency and/or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr	(888) 293-6498 (202) 512-1530
CRD	Handbook for Concrete and Cement Available from Army Corps of Engineers Waterways Experiment Station www.wes.army.mil	(601) 634-2355
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point www.dodssp.daps.mil	(215) 697-6257
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point www.dodssp.daps.mil	(215) 697-6257
	Available from General Services Administration www.fss.gsa.gov	(202) 501-1021
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MIL	See MILSPEC	
MS MIL	See MILSPEC	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point www.dodssp.daps.mil	(215) 697-6257
UFAS	Uniform Federal Accessibility Standards Available from Access Board	(800) 872-2253 (202) 272-0080

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA	BOCA International, Inc. (See ICC)	
CABO	Council of American Building Officials (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICBO	International Conference of Building Officials (See ICC)	
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)	
ICC	International Code Council (Formerly: CABO - Council of American Building Officials) www.iccsafe.org	(703) 931-4533
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	
C.	State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.	
CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation www.dca.ca.gov/bhfti	(800) 952-5210 (916) 574-2041
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(415) 703-2782
TFS	Texas Forest Service Forest Products Laboratory www.txforests-service.tamu.edu	(936) 639-8180

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

- A. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- B. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

- A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized steel bases for supporting posts.
- B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."
- C. Paint: Comply with requirements in Division 9 painting Sections.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack board.
 - 3. Drinking water and private toilet.
 - 4. Coffee machine and supplies.
 - 5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
 - 1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- F. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 - 1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
 - 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Architect's office.
 - e. Engineers' offices.

- f. Owner's office.
 - g. Principal subcontractors' field and home offices.
- 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.
 - 1. Provide DSL in primary field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
 - 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- D. Existing Stair Usage: Use of Owner's existing stairs will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.
- E. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- B. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- C. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas.

2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction. Minimize all field welding.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- B. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION 01500

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 1 Section "Alternates" for products selected under an alternate.
 - 2. Division 1 Section "References" for applicable industry standards for products specified.
 - 3. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
 - 4. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Cost information, including a proposal of change, if any, in the Contract Sum.
 - g. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - h. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

- a. Form of Acceptance: Change Order.
- b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

- B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Division 1 Section "Submittal Procedures."
- b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
 2. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 3. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 4. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 5. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
 6. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's

additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. General installation of products.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.

- c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents. Submit requests on CSI Form 13.2A, "Request for Interpretation."

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.5 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.7 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01700

SECTION 01731 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 1 Section "Selective Demolition" for demolition of selected portions of the building.
 - 2. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 3. Division 7 Section "Through-Penetration Firestop Systems" for patching fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 - 1. Primary operational systems and equipment.
 - 2. Air or smoke barriers.
 - 3. Fire-suppression systems.
 - 4. Mechanical systems piping and ducts.
 - 5. Control systems.
 - 6. Communication systems.
 - 7. Conveying systems.
 - 8. Electrical wiring systems.
 - 9. Operating systems of special construction in Division 13 Sections.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform

as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.5 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.

- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01731

SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related Sections include the following:
 - 1. Division 1 Section "Summary" for use of premises, and phasing, and Owner-occupancy requirements.
 - 2. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 3. Division 1 Section "Cutting and Patching" for cutting and patching procedures.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.

1.5 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted and security is maintained.
 - 1. Comply with requirements specified in Division 1 Section "Summary."
- B. Owner will maintain conditions existing at time of inspection for bidding purpose as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Owner will remove hazardous materials, if any exist, before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Survey of Existing Conditions: Record existing conditions by use of measured drawings preconstruction photographs preconstruction videotapes and templates.

- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary."
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area off-site.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.4 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Roofing materials and system: Demolish in sections. See Roofing: Section, 073113, Asphalt Shingles.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Division 1 Section "Construction Waste Management."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 01732

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 1 Section "Execution Requirements" for progress cleaning of Project site.
 - 3. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 5. Division 1 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
 - 6. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 - 5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 6. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 7. Complete startup testing of systems.

8. Submit test/adjust/balance records.
9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
10. Advise Owner of changeover in heat and other utilities.
11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
12. Complete final cleaning requirements, including touchup painting.
13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, which must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.

- d. Name of Contractor.
- e. Page number.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

- b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
- c. Remove tools, construction equipment, machinery, and surplus material from Project site.
- d. Remove snow and ice to provide safe access to building.
- e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- g. Sweep concrete floors broom clean in unoccupied spaces.
- h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- j. Remove labels that are not permanent.
- k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
- l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- m. Replace parts subject to unusual operating conditions.
- n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- p. Clean ducts, blowers, and coils if units were operated without filters during construction.
- q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- r. Leave Project clean and ready for occupancy.

- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01770

SECTION 01781 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include the following:
 - 1. Division 1 Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 2 through 16 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up Record Prints.
- B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one copy of each Product Data submittal.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Revisions to routing of piping and conduits.
 - d. Revisions to electrical circuitry.
 - e. Actual equipment locations.
 - f. Duct size and routing.
 - g. Locations of concealed internal utilities.
 - h. Changes made by Change Order or Construction Change Directive.
 - i. Changes made following Architect's written orders.
 - j. Details not on the original Contract Drawings.
 - k. Field records for variable and concealed conditions.
 - l. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
 3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 - 5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 01781

SECTION 01782 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation manuals for systems, subsystems, and equipment.
 - 2. Maintenance manuals for the care and maintenance of products, materials, and finishes systems and equipment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 1 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 4. Divisions 2 through 16 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Final Submittal: Submit three copies of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name, address, and telephone number of Contractor.
 - 6. Name and address of Architect.
 - 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 - 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 - 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

- a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
- b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.3 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard printed maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.

- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
1. Do not use original Project Record Documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."
- E. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01782

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
 - 2. Drainage course for slabs-on-grade.
 - 3. Subbase course for concrete walks and pavements.
 - 4. Excavating and backfilling trenches.
- B. Related Sections include the following:
 - 1. Division 3 Section "Cast-in-Place Concrete" for granular course over vapor retarder.

1.3 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.
- E. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Additional Excavation: Excavation below subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.

- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- I. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D 1557 for each on-site or borrow soil material proposed for fill and backfill.

1.5 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's written permission.
 - 3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Backfill and Fill: Satisfactory granular soil materials.

- E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: See site preparation notes on structural drawings for additional soils requirements.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: 12 inches on each side of pipe or conduit.
- C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 APPROVAL OF SUBGRADE

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for record documents.

3. Inspecting and testing underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.11 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings.
- C. Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.
- D. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.
 1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
- E. Coordinate backfilling with utilities testing.
- F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
- G. Place and compact final backfill of satisfactory soil material to final subgrade.

3.12 FILL

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- C. Place and compact fill material in layers to required elevations as follows:
 1. Under walks and pavements, use satisfactory soil material.
 2. Under steps and ramps, use engineered fill.
 3. Under building slabs, use engineered fill.
 4. Under footings and foundations, use engineered fill.

3.13 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil to not less than that indicated in the site preparation notes on the structural drawings.

3.15 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 1. Lawn or Unpaved Areas: Plus or minus 1 inch.

3.16 SUBBASE AND BASE COURSES

- A. Install separation fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
- B. Under pavements and walks, place subbase course on prepared subgrade and as follows:
 1. Place base course material over subbase.
 2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
 3. Shape subbase and base to required crown elevations and cross-slope grades.
 4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
 5. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.17 DRAINAGE COURSE

- A. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:
 1. Compact drainage course to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
 2. When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.

3. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.18 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Testing agency shall inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 1000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 40 feet or less of wall length, but no fewer than two tests.
 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 40 feet or less of trench length, but no fewer than two tests.
 4. Continuous Foundations: 1 Test per lift per each 15 linear feet.
 5. Spot Foundations: 1 Test per each lift.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.19 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

SECTION 02741 - HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hot-mix asphalt patching.
- B. Related Sections include the following:
 - 1. Division 2 Section "Earthwork" for aggregate subbase and base courses and for aggregate pavement shoulders.

1.3 DEFINITIONS

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.
- B. DOT: Department of Transportation.

1.4 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of state or local DOT.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
- B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- C. Material Test Reports: For each paving material.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer.
 - 1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located.
- B. Regulatory Requirements: Comply with State of Utah Standard Specification for Road and Bridge Construction of Utah Department of Transportation (UDOT) for asphalt paving work.
- C. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Materials suppliers shall provide, upon request, verification of a consistent record of meeting or exceeding materials or performance standards as specified herein.
- B. Asphaltic Concrete thickness:
 - 1. 3" compacted thickness minimum.

2.2 MATERIALS

- A. Asphaltic cement:
 - 1. Viscosity Graded original, AC-10, conforming to requirements of ASTM D-3381 (AASHTO M-226, Table 2), and Section 704.03 – State of Utah Standard Specifications for Road and Bridge Construction.
 - 2. Shall not foam when heated to 350 deg. F.
- B. Mineral aggregate:
 - 1. Shall consist of crushed stone, crushed gravel, or crushed slag, or a combination thereof; free of clay, slit, organic matter or other deleterious materials.
 - 2. Gradation shall be in accordance with the following:
 - a.

Asphaltic Concrete	
<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
1/2"	100
#4	55 – 85
#16	24 – 38
#50	9 – 21
#200	4 – 8
 - 3. Course aggregate, retained on the No. 4 sieve shall consist of clean, hard rough, durable and sound fragments, with not less than 50 percent of particles by weight with at least one mechanically fractured face or clean angular face.
 - 4. Fine aggregate passing the No. 4 sieve may be either a natural or manufactured product. The aggregate shall be clean, hard grained and moderately sharp, and shall contain not more than 2 percent by weight of vegetable matter or other deleterious substances.

5. That portion of the fine aggregate passing the No. 40 sieve shall be nonplastic when tested in accordance with ASTM D-424.
6. The weight of minus 200 mesh material retained in the aggregate, as determined by the difference in percent passing a No. 200 sieve by washing and dry sieving without washing, shall not exceed 6 percent of the total sample weight. That portion of fine aggregate passing the No. 200 sieve shall be determined by washing with water in accordance with ASTM C-117.
7. The aggregate shall be of uniform density and quality and shall have a rodded weight of not less than 100 pounds per cubic foot when tested in accordance with ASTM C-29.
8. The aggregate shall have a percentage of wear not exceeding forty when tested in accordance with ASTM C-131 and C-535.
9. The aggregate shall have a weighted loss not exceeding 12 percent by weight when subject to five cycles of sodium sulfate and tested in accordance with ASTM C-88, D-1073, and D-692.

2.3 ASPHALTIC CONCRETE PAVING MIXTURE

- A. Combine mineral constituents and asphalt cement in proportions per mix design at a central plant to produce an asphaltic concrete pavement mix.
- B. Mix design shall be based on the Marshall Method. The combined mineral aggregate plus any approved additives when mixed with the asphaltic cement in accordance with ASTM D-1559 shall conform to the following requirements:
 1. Marshall Stability: 1200 pounds minimum
 2. Flow (0.01 inch): 10-18
 3. Voids Content 1.5% to 3%
 4. Asphaltic Cement Content: 5% to 6% by weight.
- C. The asphaltic cement shall be heated at the mixing plant to a temperature at which it can be applied uniformly to the aggregate.
- D. Coarse and fine aggregate shall be stored separately at the mixing plant in a manner that will prevent intermingling.
- E. When it is necessary to blend aggregates from one or more sources to produce the combined gradation, each source or size of aggregate shall be stockpiled individually. Aggregate from the individual stockpiles shall be fed through separate bins to the cold elevator feeders. They shall not be blended in the stockpile.
- F. Cold aggregates shall be fed carefully to the plant so that surpluses and shortages will not occur and cause breaks in the continuous operation.
- G. The aggregate shall be dried and heated to provide a paving mixture temperature in conformance with placing conditions, but not to exceed 163 deg C (325 deg F.).
- H. The heated and dried aggregates shall not contain enough moisture to cause the mixture to slump, the asphalt to foam, or the aggregate to segregate during hauling and placing.
- I. The shortest mixing time consistent with satisfactory coating of the aggregate shall be used. The mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 96 percent of the particles retained on the No. 4 sieve are coated with asphaltic cement. The required mixing time, as determined above, shall be in accordance with ASTM D-2489.
- J. If a dryer drum mixing process is used, the mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 98 percent of the particles

retained on the No. 4 sieve are coated with asphaltic cement. The moisture content of the asphaltic cement sampled behind the laydown machine prior to compaction shall not exceed 1 percent by weight.

2.4 TACK COAT

- A. Cut-back asphalt RC or MC 70 or 250.

PART 3 - EXECUTION

3.1 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd..
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.
- D. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.2 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt surface course in single lift.
 - 2. Spread mix at minimum temperature of 250 deg F.
 - 3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 - 4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.3 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints as described in AIMS-22, "Construction of Hot Mix Asphalt Pavements."
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.4 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
 - 2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.5 INSTALLATION TOLERANCES

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances: Retain thickness tolerances below or revise to suit Project.
 - 1. Course: Plus 1/4 inch, no minus.

- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Course: 1/8 inch.
 - 2. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.7 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow excavated materials to accumulate on-site.

END OF SECTION 02741

SECTION 03301 - CAST-IN-PLACE CONCRETE (LIMITED APPLICATIONS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes, for noncritical applications of concrete and for projects using small quantities of concrete.
- B. Related Sections include the following:
 - 1. Division 2 Section "Earthwork" for drainage fill under slabs-on-grade.

1.3 SUBMITTALS

- A. General: In addition to the following, comply with submittal requirements in ACI 301.
- B. Product Data: For each type of product indicated.
- C. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- C. Comply with ACI 301, "Specification for Structural Concrete," including the following sections, unless modified by requirements in the Contract Documents:
 - 1. "General Requirements."
 - 2. "Formwork and Formwork Accessories."
 - 3. "Reinforcement and Reinforcement Supports."
 - 4. "Concrete Mixtures."
 - 5. "Handling, Placing, and Constructing."
- D. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Furnish formwork and formwork accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, Type II.
- B. Normal-Weight Aggregate: ASTM C 33, graded, 1-1/2-inch nominal maximum aggregate size.
- C. Water: ASTM C 94/C 94M; potable.

2.4 RELATED MATERIALS

- A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.5 CURING MATERIALS

- A. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.6 CONCRETE MIXTURES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of floor slabs to receive troweled finishes to exceed 3 percent.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.2 STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.3 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Construction joints are not required. All construction joints locations need prior approval by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated.
 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 1. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3.4 CONCRETE PLACEMENT

- A. Comply with ACI 301 for measuring, batching, mixing, transporting, and placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- C. Consolidate concrete with mechanical vibrating equipment.

3.5 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 - 1. Do not further disturb surfaces before starting finishing operations.
- C. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

3.6 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- C. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
 - 1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Tests: Perform according to ACI 301.
 - 1. Testing Frequency: One composite sample shall be obtained for each day's pour of each concrete mix exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - 2. Testing Frequency: One composite sample shall be obtained for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.

3.8 REPAIRS

- A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 03301

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Steel ladders.
 - 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 3. Miscellaneous metal trim.
- B. Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for metal framing anchors and other rough hardware.

1.3 SUBMITTALS

- A. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- B. Welder Certificate: Submit current certificate that each welder is AWS qualified for the specific type of welding required. Current certificate must be within one year.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.2, "Structural Welding Code--Aluminum."
 - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
 - 4. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.6 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 PAINT

- A. Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carboline 621; Carboline Company.
 - b. Aquapon Zinc-Rich Primer 97-670; PPG Industries, Inc.
 - c. Tneme-Zinc 90-97; Tnemec Company, Inc.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FASTENERS

- A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36.
- D. Machine Screws: ASME B18.6.3.
- E. Lag Bolts: ASME B18.2.1.
- F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
- G. Plain Washers: Round, carbon steel, ASME B18.22.1.
- H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.
- I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.
- J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

2.5 GROUT

- A. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Shear and punch metals cleanly and accurately. Remove burrs.
- C. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
- H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- J. Remove sharp or rough areas on exposed traffic surfaces.
- K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.7 STEEL LADDERS

- A. General: Fabricate ladders for locations shown, with dimensions, spacings, details, and anchorages as indicated.
1. Comply with ANSI A14.3, unless otherwise indicated.
 2. After fabrication hot-dip G90 (minimum) galvanize all exposed steel parts and paint white unless otherwise indicated. (exterior ladders only)
- B. Siderails: Continuous, steel flat bars, with eased edges. See drawings for sizes and construction requirements.
- C. Bar Rungs: 3/4-inch- diameter steel bars, spaced 12 inches o.c.
- D. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.
- E. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.
- F. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports indicated and as necessary to complete the Work.

- B. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches wide by 1/4 inch thick by 8 inches long at 24 inches o.c., unless indicated otherwise on the Drawings.
 - 2. Furnish inserts if units must be installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

2.9 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.

2.10 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05500

SECTION 06105 - MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Rooftop equipment bases and support curbs.
 - 2. Wood blocking, cants, and nailers.
 - 3. Plywood roof deck.
- B. Related Sections include the following:
 - 1. None

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

- B. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPAC2.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Comply with performance requirements in AWPAC20 (lumber) and AWPAC27 (plywood).
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Use Exterior type for exterior locations and where indicated.

3. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
 4. Use Interior Type A, unless otherwise indicated.
- B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings, and the following:
1. Concealed blocking.
 2. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content of any species.
- C. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.5 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.

- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.7 METAL FRAMING ANCHORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Simpson Strong-Tie Co., Inc.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 - 1. Use for interior locations where stainless steel is not indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports, unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

- F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
 - 4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
 - 5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
 - 6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.
- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06105

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Blanket insulation
- B. Related Sections include the following:
 - 1. None
- C. Product Data: When specifically requested by the Architect, submit requested product data.
- D. Product Samples: When specifically requested by the Architect, submit requested product samples.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Blanket Glass-Fiber Insulation:
 - a. CertainTeed Corporation.
 - b. Johns Manville Corporation.
 - c. Owens Corning.

2.2 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with indicated requirements and with referenced standards.
 - 1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.
 - 2. Provide "Friction Fit", "Pinned" and/or "Glued" anchoring methods required by job conditions.
- B. Faced Glass Fiber Blanket Insulation: ASTM C 665, Type III (with reflective vapor barrier facing having K-value = 0.27), Class A (membrane-faced surface with a flame spread of 25 or less and smoke contribution of 450 or less); Category 1 (membrane is a vapor barrier with 0.5 perms min.), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face; consisting of fibers manufactured from glass.
- C. Auxiliary Insulating Materials: Use the following materials where indicated on the Drawings and/or where required by Industry Standards:
- D. Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft., with maximum permeance rating of 0.0507 perm.
- E. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- F. Adhesive for Bonding Insulation: Type recommended by insulation Manufacturer, and complying with fire-resistance requirements.
- G. Mechanical Anchors: Type and size shown or, if not shown. Provide as recommended by insulation manufacturer for type of application and condition of substrate.

PART 3 - PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation and adhesive/anchor manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to water, ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping (see Division 15 for color coding if required).
- E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.
- F. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
- G. Tape joints and ruptures in vapor retarder face and seal each continuous area of insulation to surrounding construction to ensure airtight installation. Seal butting edges of insulation.

3.4 INSTALLATION OF BLANKET INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Install blanket insulation in cavities formed by framing members according to the following requirements:
 - 1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit.
 - 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. For framing cavities 96" or greater:
 - a. Secure butting ends with stapled and/or taped joints
 - b. Support blankets by stapling flanges to flanges of studs.
 - 4. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to produce airtight installation after concealing finish material is in place.
 - 5. Where vapor barriers occur, seal all joints with approved tape.

3.5 PROTECTION

- A. Protect installed insulation (and vapor retarders where occur) from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210

SECTION 07241 - EXTERIOR INSULATION AND FINISH SYSTEMS - CLASS PB

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes Class PB exterior insulation and finish system (EIFS) with drainage applied over Plywood or OSB Board.

1.2 PERFORMANCE REQUIREMENTS

- A. Class PB EIFS: Comply with performance characteristics in EIMA's "EIMA Guideline Specification for Exterior Insulation and Finish Systems, Class PB."
 - 1. Impact Resistance: Standard.
 - 2. Positive and Negative Wind-Load Performance: Capability to withstand wind loads indicated when tested per ASTM E 330.
- B. Drainage: 3 samples capable of draining water, and having an average minimum true drainage efficiency of 90 percent when tested per EIMA 200.2.
- C. Water-/Weather-Resistive-Barrier Coating: Comply with ICBO-ES AC24.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, penetrations, terminations, fasteners, and attachments to other work.
- C. Samples: For each EIFS and for each color and texture required.
- D. Field quality-control test reports.
- E. Product certificates and test reports.
- F. Research/evaluation reports.
- G. Maintenance data.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Certified in writing by EIFS manufacturer to install manufacturer's system using trained workers.

1. Applicator shall provide letter from system manufacturer certifying application for use on Project.
 2. Applicator shall provide documentation of certification by submitted manufacturer prior to bidding.
 3. Installer shall document having performed at least three installations of similar size, scope and complexity in each of the past two years.
- B. Source Limitations: Obtain EIFS through one source from a single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with system components.
- C. Fire-Test-Response Characteristics: Where indicated, provide EIFS and system components identical to those of EIFS and system components tested per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting agency.
1. Fire-Resistance Characteristics: ASTM E 119.
 2. Full-Scale, Multistory Fire Test: Tested mockup per UBC Standard 26-4 or UBC Standard 26-9.
 3. Full-Scale Fire Test: Tested mockup per ASTM E 108.
 4. Radiant Heat Exposure: No ignition of EIFS when tested according to NFPA 268.
 5. Surface-Burning Characteristics: Insulation board, adhesives, base coats, and finish coats with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84 or UBC Standard 8-1.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockups as shown on Drawings or 2x2 samples showing mesh, heavy duty mesh, color and texture to be used on the project.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Dryvit Systems, Inc.
 2. Senergy Inc.; SKW-MBT Construction Chemicals.
 3. Sto Corp.
 4. TEC Inc.; An H. B. Fuller Company.
 5. USG Corp.

- C. Basis-of-Design Product: The design for EIFS with drainage is based on Dryvit. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. Dryvit
2. Senergy Inc.

2.2 MATERIALS

- A. Compatibility: Provide substrates, adhesive, fasteners, board insulation, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and approved for use by EIFS manufacturer for Project.
- B. Water-/Weather-Resistive-Barrier Coating: Formulation and accessories designed for indicated use.
- C. Primer/Sealer: Substrate conditioner designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive or nails used for application of insulation.
- D. Drainage Mat: Designed to drain incidental moisture by gravity; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer with manufacturer's standard corrosion-resistant mechanical fasteners suitable for intended substrate.
- E. Spacers: Furring strips; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer with manufacturer's standard corrosion-resistant mechanical fasteners suitable for intended substrate.
- F. Adhesive for Application of Insulation: Mechanical fasteners suitable for intended substrate.
- G. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with EIFS manufacturer's requirements, ASTM C 578 for Type I, and EIMA's "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board."
1. Channeled Board Insulation: EIFS manufacturer's standard factory-fabricated profile with linear, vertical drainage channels, slots, or waves on the back side of board.
- H. Reinforcing Mesh: Balanced, alkali-resistant, open-weave glass-fiber mesh treated for compatibility with other EIFS materials and complying with EIMA 105.01 and ASTM D 578.
1. Standard-Impact Reinforcing Mesh: Not less than 4.0 oz./sq. yd..
 2. Strip Reinforcing Mesh: Not less than 3.75 oz./sq. yd..
 3. Detail Reinforcing Mesh: Not less than 4.0 oz./sq. yd..
 4. Corner Reinforcing Mesh: Not less than 7.2 oz./sq. yd..
- I. Base-Coat Materials: Standard mixture.
- J. Waterproof Adhesive/Base-Coat Materials: Waterproof mixture.
- K. Primer: Factory-mixed elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

- L. Finish-Coat Materials: Standard acrylic-based coating.
 - 1. Colors, Textures, and Patterns: As selected by Architect from manufacturer's standard full range.
- M. Mechanical Fasteners: Corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener suitable for substrate.
- N. Trim Accessories: To selected by Architect from manufacturers standard trim manufactured from UV-stabilized PVC and complying with ASTM D 1784 and ASTM C 1063.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with ASTM C 1397 and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.
- B. Insulation: Adhesively and mechanically attach to substrate.
- C. Expansion Joints: Install at locations indicated; where required by EIFS manufacturer; where expansion joints are indicated in substrates behind EIFS; where EIFS adjoin dissimilar substrates, materials, and construction; at floor lines in multilevel wood-framed construction; and where wall height changes.
- D. Base Coat: Apply to exposed surfaces of insulation in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16-inch dry-coat thickness.
- E. Reinforcing Mesh: Completely embed mesh in wet base coat, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
- F. Double-Layer Reinforcing Mesh Application: Where indicated, apply second base coat and second layer of standard -impact reinforcing mesh.
- G. Double Base-Coat Application: Where indicated, apply in same manner and thickness as first application except without reinforcing mesh.
- H. Finish Coat: Apply over dry primer on existing Soffit and base coat of new EIFS, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
- I. Finish Coat over existing Soffit: Apply over dry primer on existing Soffit. Match new color for fascia. Maintain a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 07241

SECTION 07311 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Asphalt shingles.
 - 2. Fiberglass felt underlayment.
 - 3. Self-adhering sheet underlayment.
- B. Related Sections include the following:
 - 1. Division 6 Section "Miscellaneous Carpentry" for roof deck wood structural panels.
 - 2. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings and counterflashings not part of this Section.
 - 3. Division 7 Section "Roof Accessories" for skylights.

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of asphalt shingle indicated.
 - 1. Include similar Samples of trim and accessories involving color selection.
- C. Maintenance Data: For asphalt shingles to include in maintenance manuals.
- D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual that is approved, authorized, or licensed by asphalt shingle roofing system manufacturer to install roofing system indicated.

- B. Source Limitations: Obtain ridge and hip cap shingle; fiberglass felt underlayment and self-adhering sheet underlayment through one source from a single asphalt shingle manufacturer (only necessary if required for warranty).
- C. Fire-Test-Response Characteristics: Provide asphalt shingle and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double-stack rolls.
 - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt shingle roofing to be performed according to manufacturer's written instructions and warranty requirements.
 - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period. Materials failures include manufacturing defects and failure of asphalt shingles to self-seal after a reasonable time.
 - 1. Material Warranty Period: GAF, Smart Choice Plus Limited Warranty, 50 years from date of Substantial Completion, prorated, with first 12 years nonprorated.
 - 2. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 110 mph for 5 years from date of Substantial Completion.
 - 3. Workmanship Warranty Period: 5 years from date of Substantial Completion.
- B. Special Project Warranty: Roofing Installer's warranty, on warranty form at end of this Section, signed by roofing Installer, covering Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within the following warranty period:

1. Warranty Period: Five years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Asphalt Shingles: 100 sq. ft of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include:

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D 3462, Class A, UL rating, ASTM D3018, ASTM D 3161, CSA A123.5-M90, CSA A123.5-98, Passes UL 110 mph Wind Test laminated, multi-ply overlay construction, glass-fiber reinforced, 5 inch exposure, mineral-granule surfaced, Algae Eater Protection, and self-sealing

1. Available Products:

- a. GAF Materials Corporation; Grand Canyon, shake
- b. CertainTeed Corporation; Presidential, shake

2. Butt Edge: Straight cut.
3. Strip Size: Manufacturer's standard.
4. Algae Resistance: Granules treated to resist algae discoloration.
5. Color and Blends: As selected by Architect from manufacturer's full range.

- B. Hip and Ridge Shingles: Manufacturer's, GAF, Pacific Ridge Cap Shingles, 5 inch exposure or CertainTeed equal.

2.3 UNDERLAYMENT MATERIALS

- A. Fiberglass reinforced felt: ASTM D 226, D4869, UL, Shingle-mate, Water permeance 28.3, nonperforated.

- B. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 60-mil- thick, slip-resisting, polyethylene-film-reinforced top, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

1. Products:

- a. GAF, STORMGUARD, 60 mils D751 test, Film-surfaced, UL Listed or CertainTeed equal.
- b. GAF, Shingle-Mate, Glass-reinforced felt or CertainTeed equal.

2.4 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized steel wire shingle nails, minimum 0.120-inch- diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized steel wire with low profile capped heads or disc caps, 1-inch minimum diameter.

2.5 METAL FLASHING AND TRIM

- A. Sheet Metal Flashing and Trim: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."
 - 1. Sheet Metal: Prepainted, metallic-coated steel. All metal to be 24 ga. Prepainted metallic-coated steel, 20 yr minimum warranty.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.
 - 1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches over and 4 inches beyond each side of downslope asphalt shingles and 6 inches up the vertical surface.
 - 2. Step Flashings: Fabricate with a headlap of 2 inches and a minimum extension of 4 inches over the underlying asphalt shingle and up the vertical surface.
 - 3. Cricket Flashings: Fabricate with concealed flange extending a minimum of 24 inches beneath upslope asphalt shingles and 6 inches beyond each side of skylight and 6 inches above the roof plane.
 - 4. Drip Edges: Fabricate in lengths not exceeding 10 feet. See Roofing Drawing details.
 - 5. Open Valley Flashings: Fabricate in lengths not exceeding 10 feet with 1-inch- high inverted-V profile at center of valley and equal flange widths of 12 inches. See Drawing details.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
 3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Single-Layer Fiberglass reinforced felt Underlayment: Install single layer of felt underlayment on Self-Adhering Sheet underlayment perpendicular to roof slope in parallel courses. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with felt underlayment roofing nails.
1. Install felt underlayment separator on self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches in direction to shed water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment; wrinkle free, on roof deck, on all sections of roof. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.
1. Eaves: See Drawings. Continues and multiple layers.
 2. Rakes: See Drawings.
 3. Valleys: Extend from lowest to highest point 18 inches on each side. See drawings.
 4. Hips: Extend 18 inches on each side.
 5. Ridges: Extend 36 inches on each side.
 6. Sidewalls: Extend beyond sidewall 18 inches and return vertically against sidewall not less than 4 inches. See drawings.
 7. Dormers, Chimneys, Skylights, and other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches and return vertically against penetrating element not less than 4 inches.
 8. Roof Slope Transitions: Extend 18 inches on each roof slope.

3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."
1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.
- C. Step Flashings: Install with a headlap of 2 inches and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.

- D. Cricket Flashings: Install against the roof-penetrating element extending concealed flange beneath upslope asphalt shingles and beyond each side.
- E. Open Valley Flashings: Install centrally in valleys, lapping ends at least 12 inches in direction to shed water and provide two beads of continuous sealant crosswise off metal 1 inch in from each end of lap to prevent water penetration of joint. Fasten upper end of each length to roof deck beneath overlap.
 - 1. Secure hemmed flange edges into metal cleats spaced 12 inches apart and fastened to roof deck.
 - 2. Adhere 18-inch- wide strip of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.
- F. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.
- G. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- H. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT SHINGLE INSTALLATION

- A. Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Install starter strips along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches wide with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles over fascia at eaves and rakes as per drawing detail.
 - 2. Install starter strip along rake edge as per drawing.
- C. Install first and remaining courses of asphalt shingles stair stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.
- E. Fasten asphalt shingle strips with a minimum of six (6) roofing nails located according to manufacturer's written instructions.
 - 1. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
 - 2. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
- F. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.
- G. When shingle will be in shade 100 per cent of the time, seal asphalt shingles with asphalt roofing cement spots.
- H. Open Valleys: Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width of exposed open valley from highest to lowest point.
 - 1. Set valley edge of asphalt shingles in a 3-inch-wide bed of asphalt roofing cement.
 - 2. Do not nail asphalt shingles to metal open valley flashings.

- I. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing as per manufacture.

3.5 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 1. Owner: State of Utah, Division of Facilities Construction Management.
 2. Address: 4110 State Office Building
Salt Lake City, Utah 84114-1201
 3. Agency: Utah State Courts Administration.
 4. Building Name/Type: Juvenile Court Building
 5. Address: 2021 South State, Provo, Utah, 84606
 6. Area of Work: Removal of Existing Metal Roof & replace with asphalt shingles, New metal gutters, downspouts, Skylights, New secondary drains, Mechanical supply and returns ducts.
 7. Acceptance Date: _____.
 8. Warranty Period: 5 years Labor
 9. Expiration Date: _____.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
 1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding 110 mph;
 - c. Fire
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment

of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____
2. Name: _____
3. Title: _____

END OF SECTION 07311

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes sheet metal flashing and trim in the following categories:
 - 1. Roof-drainage systems.
 - 2. Exposed trim, drip edge, and fascia.
 - 3. Copings.
 - 4. Metal flashing and Counter flashing.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 7 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
 - 2. Division 7 Section "Joint Sealants" for elastomeric sealants.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.
- B. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the following wind zone(s) as applicable:
 - 1. Wind Zone 1: Wind pressures of 10 to 20 psf.
 - 2. Wind Zone 1: Wind pressures of 21 to 30 psf.
 - 3. Wind Zone 2: Wind pressures of 31 to 45 psf.
 - 4. Wind Zone 3: Wind pressures of 46 to 104 psf.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.
- C. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

1.6 PROJECT CONDITIONS

- A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.
- B. FACTORY FINISHED COLOR COATING WARRANTY:
- C. Provide 20 year NDL Factory Finish Color Coating Warranty as follows:
 - 1. Color change: less than 5-Delta-E (Hunter) units per ASTM D2244-85.
 - 2. Chalking : less than No. 8 per ASTM D659-86.
 - 3. Film integrity: no cracking or delamination.

PART 2 - PRODUCTS

2.1 METALS

- A. Color coated steel: Fluoropolymer coating factory applied to 24 gage commercial quality, extra smooth, AISI G90, hot dipped galvanized steel, ASTM A 446-76, Grade A, primed and finished one side with fluoropolymer coating, 1.0 plus or minus 0.1 mil total dry film thickness and a wash coat of 0.3 to 0.4 mil dry film thickness applied to reverse side.
- B. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet, with a minimum thickness of 0.0625 inch except not less than 0.0937 inch thick for applications where burning (welding) is involved.

2.2 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.3 FACTORY FINISH COLOR COATING PRODUCTS:

- A. Hylar 5000
- B. Kynar 500.

2.4 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Burning Rod for Lead: Same composition as lead sheet.
- B. Solder: ASTM B 32, Grade Sn50, used with rosin flux.
- C. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.
- D. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.
- E. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- F. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."
- G. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.
- H. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
- I. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
- J. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

2.5 FABRICATION, GENERAL

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
- D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- E. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- F. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

- G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 - 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.6 SHEET METAL FABRICATIONS

- A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.
- B. Roof-Drain Flashing: Fabricate from the following material:
 - 1. Lead: 4.0 lb/sq. ft., hard tempered. Or as per manufactures recommendations for product existing.

2.7 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
 - 1. Gutter Style: A.
 - 2. Expansion Joints: Butt type.
 - 3. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen, Bronze wire ball downspout strainer and Valley baffles.
 - 4. Gutters with Girth up to 15 Inches: Fabricate from the following material:
 - a. Prepainted, Metallic-Coated Steel: 24 gage thick.
- B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Manufactured Hanger Style: See drawings.
 - 2. Fabricate downspouts from the following material:
 - a. Prepainted, Metallic-Coated Steel: 24 ga. thick.
- C. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight.
 - 1. Joint Style: Butt, with 6-inch- wide exposed cover plates.
 - 2. Fabricate copings from the following material:
 - a. Prepainted, Metallic-Coated Steel: 24 Ga. thick.

- D. Base Flashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 24 ga. thick.
- E. Counterflashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 24 ga. thick.
- F. Flashing Receivers: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 24 ga. thick.
- G. Roof-Penetration Flashing: Fabricate from the following material:
 - 1. Lead: 4lb, hard tempered.
 - 2. Prepainted, Metallic-Coated Steel: 24 ga. thick.
- H. Roof-Drain Flashing: Fabricate from the following material:
 - 1. Match existing for Warrenty of Manufacturer.

2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 24 ga. thick.
- B. Valley Flashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 24 ga. thick.
- C. Drip Edges: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 24 ga.thick.
- D. Eave, Rake Flashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 24 ga. thick.
- E. Base Flashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 24 ga. thick.
- F. Counterflashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 24 ga. thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 FACTORY FINISH COLOR COATING UAGAGE:

- A. Factory Finish Color Coated metal shall be used at all locations that are visible to pedestrian traffic and other locations as specifically indicated on the Drawings.

3.3 INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.
- D. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- E. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches, except where pretinned surface would show in finished Work.
 - 1. Pretinning is not required for the following metals:
 - a. Lead.
 - b. Lead-coated copper.
 - 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.
 - 1. Use joint adhesive for nonmoving joints specified not to be soldered.
- G. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- H. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

1. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.
- I. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches and bed with sealant.
- J. Roof-Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the item manufacturer, to drain roof in the most efficient manner. Coordinate roof-drain flashing installation with roof-drainage system installation. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation.

3.4 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with butyl sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored straps spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 1. Fasten gutter spacers to front and back of gutter.
 2. Loosely lock straps to front gutter bead and anchor to roof deck.
 3. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
 4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
 5. Anchor gutter with spikes and ferrules spaced not more than 30 inches apart.
 6. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.
 7. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
- C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
 1. Provide elbows at base of downspout to direct water away from building provide splash guard at wall.
 2. Connect downspouts to underground drainage system indicated.
- D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - 1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 16-inch centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - 1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 16-inch centers.
 - 2. Anchor interior leg of coping with screw fasteners and washers at 12 inch centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant.
 - 1. Secure in a waterproof manner by means of anchor and washer at 36-inch centers.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
 - 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 - 2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 07620

SECTION 07730 - ROOF HATCH SAFETY GUARDRAIL

PART 1 - GENERAL

1.1 DESCRIPTION OF THE WORK:

1. The Contractor shall provide all labor, material and equipment to completely install prefabricated Roof Hatch Safety Guardrail system as outlined by manufacturers written instructions.
2. OS Prefabricated Safety Rail shall be used at all roof hatches or scuttles.
3. The Contract General Conditions and Supplemental Conditions apply to this section as if completely written herein.

PART 2 - PRODUCTS

2.1 PREFABRICATED METAL ROOF HATCH SAFETY GUARDRAIL AND MOUNTING

First Manufacturer:

Safety Systems Inc.
P.O. Box 1149
Riverton, Utah 84065
Phone 1-801-254-8909
Fax 1401-254-9008

Second Manufacturer:

KeeHatch Railing Systems
Phone 1-800-851-5181

Third Manufacturer:

Savannah Trims
Tel.: 1-561-640-0850

PART 3 - CONSTRUCTION

- 3.1 SAFETY RAILS SHALL BE CONSTRUCTED and meet OSHA standards 1910.23 and 1910.27 with reference to ANSI A1264.1-1995 by protecting the hole while the roof hatch is open and by providing the proper extension of a fixed ladder to a platform. In this case the platform is the roof

1. Safety Railing System: Manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation.
 - a. Test Load: Per A.H.J.
 - b. Height: 42 inches above finished roof deck.
 - c. Pipe or Tube: 1-1/4-inch ID galvanized pipe or 1-5/8-inch OD galvanized tube.
 - d. Flat Bar: 2-inch- high by 3/8-inch- thick galvanized steel.
 - e. Chain Passway Enclosure: Galvanized proof coil chain with quick link on fixed end.
 - f. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
 - g. Pipe Ends and Tops: Covered or plugged with weather-resistant material.
 - h. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.

- i. Fabricate joints that will be exposed to weather in a watertight manner.
- j. Close exposed ends of handrail and railing members with prefabricated end fittings.
- k. Fasteners: Manufacturer's standard.

3.2 MINIMUM HEIGHT OF RAILING shall be 42" above finished roof with a minimum 1-1/2 " schedule 40 pipe with all accessories and powder coated safety orange in accordance with OSHA 1910.23 and 1910.27

3.3 SHOP DRAWINGS shall be submitted to the Architect for his review 10 days prior to fabrication.

END OF SECTION 07730

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes sealants for the following applications, including those specified by reference to this Section:
 - 1. Exterior metal to metal joints
 - 2. Exterior metal to Masonry or concrete.
 - 3. All other exterior joints exposed to the elements.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
 - 2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
 - 3. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period shall be as indicated in paragraph 2.3B but not less than 50 years from date of Substantial Completion.
- D. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules at the end of Part 3.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
- B. Approved Manufacturers and Products:
- C.
 - 1. Dow Caulk #795

2.4 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Type C: Closed-cell material with a surface skin.
 - 2. Type O: Open-cell material.
 - 3. Type B: Bicellular material with a surface skin.
 - 4. Type: Any material indicated above.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. EIFS System
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.6 ELASTOMERIC JOINT-SEALANT SCHEDULE

- A. Single-Component Nonsag Polysulfide Sealant: Where joint sealants of this type are indicated, provide the following: products listed in order of preference:
 - 1. **Approved Manufacturers and Products:**
 - a. Dow Caulk #795

- B. Type and Grade: S (single component) and NS (nonsag).
- C. Class: 25.
- D. Use Related to Exposure: NT (non-traffic).
- E. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated O.
 - 1. Below are examples of Use O substrates. Retain only those that apply or insert others.
 - a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, granite, limestone, marble, ceramic tile, and wood.
 - 1) Applications:
 - a) Wall joints (exterior)
 - b) Flashing and coping joints
 - c) Interior wall and ceiling joints

END OF SECTION 07920

SECTION 08311 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Ceiling access doors and frames.
- B. Related Sections include the following:
 - 1. Division 7 Section "Roof Accessories" for roof hatches.

1.3 SUBMITTALS

- A. Product Data: For each type of door and frame indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain doors and frames through one source from a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Access Doors:
 - a. Karp Associates, Inc.
 - b. Larsen's Manufacturing Company.
 - c. Milcor Limited Partnership.

2.2 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, and surface defects; pickled and oiled; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M.
- B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M. Electrolytic zinc-coated steel sheet, complying with ASTM A 591/A 591M, Class C coating, may be substituted at fabricator's option.

2.3 PAINT

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

2.4 ACCESS DOORS AND FRAMES

- A. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.
 - 1. Locations: ceiling surfaces.
 - 2. Door: Minimum 0.060-inch- thick sheet metal, set flush with exposed face flange of frame.
 - 3. Frame: Minimum 0.060-inch- thick sheet metal with 1-1/4-inch- wide, surface-mounted trim.
 - 4. Hinges: Continuous piano hinge.
 - 5. Latch: Screwdriver-operated cam latch.

2.5 FABRICATION

- A. General: Provide access door assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 - 1. Exposed Flanges: As indicated.
 - 2. Provide mounting holes in frames to attach frames to metal or wood framing in plaster and drywall construction and to attach masonry anchors in masonry construction. Furnish adjustable metal masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.7 STEEL FINISHES

- A. Surface Preparation: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- B. Apply shop primer to uncoated surfaces of metal fabrications. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

3.3 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

SECTION 08620 - UNIT SKYLIGHTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes factory-assembled unit skylights for installation in flat roof areas.
 - 1. Type: Mounted on site-built curb.
 - 2. Glazing: Acrylic.
- B. Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for wood framing and blocking at unit skylights.
 - 2. Division 7 Section "Sheet Metal Flashing and Trim" for flashing at unit skylights.
 - 3. Division 7 Section "Roof Accessories" for roof hatches and smoke vents.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Loads: Provide unit skylights, including glazing and anchorage, capable of withstanding the effects of the following design loads:
 - 1. Snow Load: 30 psf.
 - 2. Negative Pressure (Uplift) Load: 15 psf.

1.4 SUBMITTALS

- A. Product Data: For unit skylights. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1.5 QUALITY ASSURANCE

- A. Fire-Test Response Characteristics of Plastic Glazing: Provide plastic glazing sheets identical to those tested for fire-exposure behavior per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Self-Ignition Temperature: 650 deg F or greater for plastic sheets in thickness indicated when tested per ASTM D 1929.
 - 2. Smoke Production Characteristics: Comply with either requirement below:

- a. Smoke-Developed Index: 450 or less when tested per ASTM E 84 on plastic sheets in manner indicated for use.
 - b. Smoke Density: 75 or less when tested per ASTM D 2843 on plastic sheets in thickness indicated for use.
- 3. Relative-Burning Characteristics: Tested per ASTM D 635.
 - a. Acrylic Glazing: Class CC2, burning rate of 2.5 inches per minute or less for nominal thickness of 0.060 inch or thickness indicated for use.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Uncontrolled water leakage.
 - 2. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 3. Yellowing of acrylic glazing.
- B. Warranty Period: Five years from Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Aladin
 - 2. Kalwall Corporation
 - 3. Naturalite Skylight Systems
 - 4. O'Keeffe's Inc.
 - 5. Plasteco, Inc.
 - 6. Plasticrafts/Faulkner Plastics, Cadillac Plastic Co.
 - 7. Skyline Products, Inc./Sky-Lites
 - 8. Solar Industries, Inc.
 - 9. Sunglo Skylights
 - 10. Wasco Products, Inc.

2.2 UNIT SKYLIGHTS

- A. General: Factory-assembled units that include glazing, extruded-aluminum glazing retainers, gaskets, and inner frames and that are capable of withstanding design loads indicated.
- B. Site-Built Curb: As specified in Division 6 Section "Rough Carpentry."
- C. Unit Shape and Size: As indicated.
- D. Acrylic Glazing: ASTM D 4802, thermoformable, monolithic sheet, Category as standard with manufacturer, Type UVA (formulated with UV absorber), Finish 1 (smooth or polished).

1. Double-Glazing Profile: Dome, 25 percent rise.
 - a. Outer Glazing Color: translucent.
- E. Glazing Gaskets: Manufacturer's standard.
- F. Aluminum Components:
 1. Sheets: ASTM B 209, alloy and temper to suit forming operations and finish requirements but with not less than the strength and durability of alclad alloy 3005-H25.
 2. Extruded Shapes: ASTM B 221, alloy and temper to suit structural and finish requirements but with not less than the strength and durability of alloy 6063-T52.
 3. Anodic Coating: Class I, clear anodic coating complying with AAMA 611.
- G. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened.
 1. Where removal of exterior exposed fasteners might allow access to building, provide nonremovable fastener heads.
- H. Condensation Control: Fabricate unit skylights with integral internal gutters and nonclogging weeps to collect and drain condensation to the exterior.

2.3 INSTALLATION MATERIALS

- A. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic, nominally free of sulfur and containing no asbestos fibers, formulated for 15-mil dry film thickness per coating.
- B. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- C. Elastomeric Sealant: ASTM C 920; Type S; Grade NS; Class 25; and Uses NT, G, A, and (as applicable to joint substrates indicated) O; recommended by unit skylight manufacturer and compatible with joint surfaces.
- D. Roofing Cement: ASTM D 4586, asbestos free, designed for trowel application or other adhesive compatible with roofing system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate unit skylight installation with installation of substrates, vapor retarders, roof insulation, roofing, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.
 1. Unless otherwise indicated, install unit skylights according to construction details of NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Where metal surfaces of units will contact incompatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation recommended in writing by unit skylight manufacturer.

- C. Anchor unit skylights securely to supporting substrates.
- D. Set unit skylight flanges in thick bed of roofing cement to form a seal, unless otherwise indicated.
- E. Where cap flashing is indicated, install to produce waterproof overlap with roofing or roof flashing. Seal with thick bead of mastic sealant except where overlap is indicated to be left open for ventilation.

3.2 CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION 08620

SECTION 09912 - PAINTING (PROFESSIONAL LINE PRODUCTS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items including, but not limited to, the following factory-finished components:
 - a. Architectural woodwork.
 - b. Finished mechanical and electrical equipment.
 - c. Light fixtures.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.
 - d. Pipe spaces.
 - e. Duct shafts.
 - 3. Finished metal surfaces include the following:
 - a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper and copper alloys.
 - e. Bronze and brass.
 - 4. Operating parts include moving parts of operating equipment and the following:

- a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
- 5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
 - 2. Division 6 Section "Interior Architectural Woodwork" for shop priming interior architectural woodwork.
 - 3. Division 8 Section "Steel Doors and Frames" for factory priming steel doors and frames.
 - 4. Division 9 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.
- E. Alternates: Refer to Division 1 Section "Alternates" for description of Work in this Section affected by alternates.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 2. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 - 3. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Initial Selection: For each type of finish-coat material indicated.
 - 1. After color selection, Architect will furnish color chips for surfaces to be coated.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain primers (where occurs) for each coating system from the same manufacturer as the finish coats.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.
- B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Benjamin Moore & Co. (Benjamin Moore).
 - 2. Kelly-Moore Paint Co. (Kelly-Moore).
 - 3. PPG Industries, Inc. (Pittsburgh Paints).
 - 4. Sherwin-Williams Co. (Sherwin-Williams).

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: As selected by Architect from manufacturer's full range.

2.3 EXTERIOR PRIMERS

- A. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.
 - 1. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils.
 - 2. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust Inhibitive Primer: Applied at a dry film thickness of not less than 2.0 mils.
 - 3. Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 3.0 mils.
 - 4. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils.

2.4 INTERIOR PRIMERS

- A. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.
 - 1. Benjamin Moore; Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer No. 253: Applied at a dry film thickness of not less than 1.2 mils.
 - 2. Kelly-Moore; 971 Acry-Prime Interior Latex Primer/Sealer: Applied at a dry film thickness of not less than 1.6 mils.
 - 3. Pittsburgh Paints; 6-2 SpeedHide Interior Quick-Drying Latex Sealer: Applied at a dry film thickness of not less than 1.0 mil.
 - 4. Sherwin-Williams; PrepRite 200 Latex Wall Primer B28W200 Series: Applied at a dry film thickness of not less than 1.6 mils.
- B. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
 - 1. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils.
 - 2. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust Inhibitive Primer: Applied at a dry film thickness of not less than 2.0 mils.
 - 3. Pittsburgh Paints; 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 1.5 mils.
 - 4. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils.

2.5 EXTERIOR FINISH COATS

A. Exterior Full-Gloss Alkyd Enamel: Factory-formulated full-gloss alkyd enamel for exterior application.

1. Benjamin Moore; Moore's IMC Urethane Alkyd Enamel M22: Applied at a dry film thickness of not less than 2.0 mils.
2. Kelly-Moore; 1700 Kel-Guard Gloss Alkyd Rust Inhibitive Enamel: Applied at a dry film thickness of not less than 2.0 mils.
3. Pittsburgh Paints; 7-814 Pittsburgh Paints Industrial Gloss-Oil Interior/Exterior Enamel: Applied at a dry film thickness of not less than 1.5 mils.
4. Sherwin-Williams; Industrial Enamel B-54 Series: Applied at a dry film thickness of not less than 2.0 mils.

2.6 INTERIOR FINISH COATS

A. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.

1. Benjamin Moore; Moorcraft Super Spec Latex Eggshell Enamel No. 274: Applied at a dry film thickness of not less than 1.3 mils.
2. Kelly-Moore; 1610 Sat-N-Sheen Interior Latex Low Sheen Wall and Trim Finish: Applied at a dry film thickness of not less than 1.6 mils.
3. Kelly-Moore; 1686 Dura-Poxy Eggshell Acrylic Enamel: Applied at a dry film thickness of not less than 1.6 mils.
4. Pittsburgh Paints; 6-400 Series SpeedHide Eggshell Acrylic Latex Enamel: Applied at a dry film thickness of not less than 1.25 mils.
5. Sherwin-Williams; ProMar 200 Interior Latex Egg-Shell Enamel B20W200 Series: Applied at a dry film thickness of not less than 1.6 mils.

B. Interior Semigloss Alkyd Enamel: Factory-formulated semigloss alkyd enamel for interior application.

1. Benjamin Moore; Moorcraft Super Spec Alkyd Semi-Gloss Enamel No. 271: Applied at a dry film thickness of not less than 1.4 mils.
2. Kelly-Moore; 1630--Kel-Cote Interior Alkyd Semi-Gloss Enamel: Applied at a dry film thickness of not less than 2.2 mils.
3. Pittsburgh Paints; 6-1110 Series SpeedHide Interior Enamel Wall & Trim Semi-Gloss Oil: Applied at a dry film thickness of not less than 1.4 mils.
4. Sherwin-Williams; ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200 Series: Applied at a dry film thickness of not less than 1.7 mils.

2.7 INTERIOR WOOD STAINS AND VARNISHES

A. Open-Grain Wood Filler: Factory-formulated paste wood filler applied at spreading rate recommended by manufacturer.

1. Benjamin Moore; Benwood Paste Wood Filler No. 238.
2. Kelly-Moore; none required.
3. Pittsburgh Paints; none required.
4. Sherwin-Williams; Sher-Wood Fast-Dry Filler.

B. Interior Wood Stain: Factory-formulated alkyd-based penetrating wood stain for interior application applied at spreading rate recommended by manufacturer.

1. Benjamin Moore; Benwood Penetrating Stain No. 234.

2. Kelly-Moore; McCloskey Stain.
 3. Pittsburgh Paints; 77-560 Rez Interior Semi-Transparent Oil Stain.
 4. Sherwin-Williams; Wood Classics Interior Oil Stain A-48 Series.
- C. Clear Sanding Sealer: Factory-formulated fast-drying alkyd-based clear wood sealer applied at spreading rate recommended by manufacturer.
1. Kelly-Moore; 2164 E Z Sand Alkyd Q. D. Sealer.
 2. Pittsburgh Paints; 6-10 SpeedHide Quick-Drying Interior Sanding Wood Sealer and Finish.
 3. Sherwin-Williams; Wood Classics Fast Dry Sanding Sealer B26V43.
- D. Interior Alkyd- or Polyurethane-Based Clear Satin Varnish: Factory-formulated alkyd- or polyurethane-based clear varnish.
1. Benjamin Moore; Benwood Interior Wood Finishes Polyurethane Finishes Low Lustre No. 435.
 2. Kelly-Moore; 2050 Kel--Aqua Stain Base.
 3. Pittsburgh Paints; 77-7 Rez Varnish, Interior Satin Oil Clear.
 4. Sherwin-Williams; Wood Classics Fast Dry Oil Varnish, Satin A66-300 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.
1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - c. If transparent finish is required, backprime with spar varnish.
 - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
 - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - a. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - b. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convactor covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
 10. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
1. Uninsulated metal piping.
 2. Uninsulated plastic piping.
 3. Pipe hangers and supports.
 4. Tanks that do not have factory-applied final finishes.
 5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
 7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- G. Electrical items to be painted include, but are not limited to, the following:

1. Switchgear (when exposed to occupied areas).
 2. Panelboards (when exposed to occupied areas).
 3. Electrical equipment that is indicated to have a factory-primed finish for field painting.
- H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- J. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats.
- K. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:
1. Owner may engage a qualified independent testing agency, at the Owners expense, to sample paint material being used. Samples of material delivered to Project may be taken, identified, sealed, and certified in the presence of Contractor.
 2. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
 - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 EXTERIOR PAINT SCHEDULE

- A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.
 - 1. Full-Gloss Alkyd-Enamel Finish: Two finish coats over a rust-inhibitive primer.
 - a. Primer: Exterior ferrous-metal primer.
 - b. Finish Coats: Exterior full-gloss alkyd enamel.
 - 2. Galvanized Ferrous Metal-Alkyd-Gloss
 - a. 1 Coat protective coating galvanized metal primer
 - b. 2 Coats enamel

3.8 INTERIOR PAINT SCHEDULE

- A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
 - 1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior low-luster acrylic enamel.
- B. Ferrous Metal: Provide the following finish systems over ferrous metal:
 - 1. Semi-gloss Alkyd-Enamel Finish: Two finish coats over a primer.
 - a. Primer: Interior ferrous-metal primer.
 - b. Finish Coats: Interior semi-gloss alkyd enamel.
- C. Interior CMU: Provide the following finish systems over Interior CMU where exposed in occupied rooms or required by the finish schedule:
 - a. 1 Coat block filler
 - b. 2 Coats alkyd semi-gloss
- D. Interior Concrete: Provide the following finish systems over interior concrete:
 - a. 1 Coat latex wall primer
 - b. 2 Coats alkyd semi-gloss.

3.9 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

- A. Stained Woodwork: Provide the following stained finishes over new interior woodwork:
 - 1. Alkyd-Based Stain Satin-Varnish Finish: Two finish coats of alkyd-based clear satin varnish over a sealer coat and interior wood stain. Wipe wood filler before applying stain.

- a. Filler Coat: Open-grain wood filler.
- b. Stain Coat: Interior wood stain.
- c. Sealer Coat: Clear sanding sealer.
- d. Finish Coats: Interior alkyd- or polyurethane-based clear satin varnish.

B. Natural-Finish Woodwork: Provide the following natural finishes over new interior woodwork:

- 1. Alkyd-Based Satin-Varnish Finish: **Two** finish coats of alkyd-based clear satin varnish over a sanding sealer. Provide wood filler on open-grain wood before applying first varnish coat.
 - a. Filler Coat: Open-grain wood filler.
 - b. Sealer Coat: Clear sanding sealer.
 - c. Finish Coats: Interior alkyd- or polyurethane-based clear satin varnish.

END OF SECTION 09912

SECTION 15100 - MECHANICAL REQUIREMENTS

PART 1 - GENERAL CONDITIONS:

- A. The General Conditions of the Contract, with the amendments, supplements, forms and requirements in Division 1, and herewith made a part of this Division.
- B. All sections of Division 15 shall comply with the Mechanical General Requirements. The standards established in this section as to quality of materials and equipment, the type and quality of workmanship, mode of operations, safety rules, code requirements, etc., shall apply to all sections of this Division as though they were repeated in each Division.

1.2 SCOPE OF WORK:

- A. The project described herein is for the Provo 4th District Juvenile Court Re-Roof. This work shall include all labor, materials, equipment, fixtures, and devices for the entire mechanical / plumbing work and a complete operating and tested installation as required for this project.

Section 15100	Mechanical General Requirements
Section 15300	Piping Systems
Section 15400	Plumbing Systems
Section 15815	Metal Ducts
Section 15820	Duct Accessories
Section 15855	Diffusers, Registers and Grilles

1.3 SYSTEM DESCRIPTION:

- A. Install secondary roof drains with no new hub fixtures.
- B. Remove and re-install existing mechanical/plumbing piping systems as needed to accommodate the re-roofing.
- C. Test all new and existing roof drain piping. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks. Test is to be for (2) two hours

1.4 CODES & ORDINANCES:

- A. All work shall be executed in accordance with all underwriters, public utilities, local and state rules and regulations applicable to the trade affected. Should any change in the plans and Specifications be required to comply with these regulations, the Contractor shall notify the Architect before the time of submitting his bid. After entering into contract, the Contractor will be held to complete all work necessary to meet these requirements without extra expense to the Owner. Where work required by drawings or specifications is above the standard required, it shall be done as shown or specified.
- B. Applicable codes are as follows:

International Mechanical Code
International Building Code
International Plumbing Code

1.5 UTILITIES & FEES:

- A. All charges for fees and permits required by this work shall be included in the Contractor's proposal. All utility connection fees shall also be included in the proposal. Unless noted otherwise, all systems furnished and or installed by this Contractor, shall be complete with all utilities, components, commodities and accessories required for a fully functioning system.

1.6 SUBMITTALS AND SHOP DRAWINGS:

A. Submittals:

1. As soon as possible after the contract is awarded, but in no case more than 14 calendar days thereafter, the Contractor shall submit to the Architect six (6) copies of the descriptive literature covering products and materials to be used in the installation of mechanical systems for this project. The review of the submitted data will require a minimum of 7 days. If the Contractors schedule requires return of submitted literature in less than the allotted time, the Contractor shall accelerate his submittal delivery date. The Contractor shall resubmit all items requiring re-review within 5 days of returned submittals. Refer to each specification section for items requiring submittal review. Written approval of the Owner's Representative shall be obtained before installing any such equipment or materials for the project. The submittals shall be prepared in an orderly manner, contained in a binder with index and identification tabs each item or group of items and for each specification section. All items shall be submitted at one time except seismic restraint drawings which may be submitted separately within 30 days of the contract award date. Partial submittals will not be reviewed until the complete submittal is received.
2. Submitted literature shall bear the Contractor's stamp, indicating that he has checked all equipment being submitted; that each item will fit into the available space with the accesses shown on the drawings; and, further, that each item conforms to the capacity and quality standards given in the contract documents.
3. Submitted literature shall clearly indicate performance, quality, and utility requirements; shall show dimension and size of connection points. Equipment must fit into the available space with allowance for operation, maintenance, etc.
4. Review by the Owner's Representative is for general conformance of the submitted equipment to the project specification. In no way does such review relieve this Contractor of his obligation to furnish equipment and materials that comply in detail to the specification nor does it relieve the Contractor of his obligation to determine actual field dimensions and conditions that may affect his work. Regardless of any items overlooked by the submittal review, the requirements of the contract drawings and specifications must be followed and are not waived or superseded in any way by the review.
5. By description, catalog number, and manufacturer's names, standards of quality have been established by the Architect and the Engineer for certain manufactured equipment items and specialties that are to be furnished by this Division. Alternate products and equipment may be proposed for use only if specifically named in the specifications or if given written prior approval in published addenda. Design equipment is the equipment listed on the drawings or if not listed on the drawings is the equipment first named in the specifications.

B. Alternate Equipment:

1. The Contractor should protect himself with the supplier of alternate named equipment. Alternate named equipment will be reviewed only one time.
2. Should alternate equipment be submitted and be rejected, it shall not be resubmitted for review and it shall be the responsibility of this contractor. The contractor shall only submit on design equipment on future submittals. Incomplete submittal data will be rejected.
3. If the Engineer is required to do additional design work to incorporate changes caused by submitting equipment or products, different than the design equipment specified, as defined above, the contractor shall reimburse the engineer for additional time and expenses at the engineers current, recognized, hourly rates.

1.7 DRAWINGS AND MEASUREMENTS:

A. Drawings:

1. The contract document drawings show the general design, arrangements, and extent of the system. In certain cases, the drawings may include details that show more nearly exact locations and arrangements; however, the locations, as shown diagrammatically, are to be regarded as general.
2. It shall be the work of this Section to make such alterations as may be necessary to make adjustable parts fit to fixed parts, leaving all complete and in proper shape when done. All dimensions given on the drawings shall be verified as related to this work and with the Architect's office before work is started.
3. This Section shall carefully study building sections, space, clearances, etc., and then provide offsets in piping as required to accommodate the building structure and other existing conditions without additional cost to the Owner. In any case and at any time, a change in location required by obstacles, existing conditions or the installation of other trades not shown on the mechanical plans shall be made without charge.
4. The drawings shall not be scaled for roughing in measurements nor shall they be used as shop drawings. Where drawings are required for these purposes or where drawings must be made from field measurements, the Contractor shall take the necessary measurements and prepare the drawings. Shop drawings of the various subcontractors shall be coordinated to eliminate all interferences and to provide sufficient space for the installation of all equipment, piping, ductwork, etc.
5. The drawings and specifications have been prepared to supplement each other and they shall be interpreted as an integral unit with items shown on one and not the other being furnished and installed as though shown and called out on both.

B. Record Drawings:

1. Record drawings for all systems and sections of this Division shall be furnished as work of this Section. Blue-line white prints of floor plans shall be furnished by the Architect's office. These prints shall be accurately and neatly marked in colored pencil, showing all changes from schematics.
2. These drawings shall be reviewed with the Architect at least once each month, shall be submitted at time of final inspection, and shall be checked for accuracy. Failure to keep record drawings up-to-date shall be cause for withholding monthly payments.

1.8 CONTRACTOR'S USE OF BUILDING EQUIPMENT:

- A. The Contractor may use equipment such as electric motors, etc., with the written permission of the Owner. As each piece of equipment is used (such as electric motors), maintenance procedures approved by the manufacturer are to be followed. A careful record is to be kept of the length of the time the equipment is used, maintenance procedures followed, and any difficulty encountered. The record is to be submitted to the Owner upon acceptance. All fan

belts and filter media (such as bearings) shall be carefully inspected just prior to acceptance. Any excessive wear noted shall require replacement.

1.9 EXISTING CONDITIONS:

- A. The Contractor shall carefully examine all existing conditions that might affect the mechanical / plumbing systems and shall compare these conditions with all drawings and specifications for work included under this contract. He shall, at such time, ascertain and check all conditions that may affect his work. No allowance shall subsequently be made in his behalf for an extra expense incurred as a result of his failure or neglect to make such examination. This Contractor shall include in his bid proposal all necessary allowances to repair or replace any item that will remain or will be removed, and any item that will be damaged or destroyed by new construction.
- B. The Contractor shall remove all abandoned piping, etc., required by new construction and cap or plug openings. No capping, etc., shall be exposed in occupied areas. All openings of items removed shall be sealed to match adjacent surfaces.
- C. The Contractor shall verify the exact location of all existing services, utilities, piping, etc., and make connections to existing systems as required or as shown on the drawings. The exact location of each utility line, together with size and elevation, shall be established before any on-site lines are installed. Should elevation or size of existing main utility lines make connections to them impossible as shown on drawings, then notification of such shall immediately be given to the Owners Representative for a decision.

1.10 EQUIPMENT CAPACITIES:

- A. Capacities shown for equipment in the specifications and on the drawings are the minimum acceptable. No equipment shall be considered as an alternate which has capacities or performance less than that of design equipment.

1.11 COOPERATION WITH OTHER TRADES:

- A. The Contractor shall refer to other drawings and parts of this specification that cover work of other trades that is carried on in conjunction with the mechanical work such that all work can proceed without interference resulting from lack of coordination.
- B. The Contractor shall properly size and locate all openings, chases, sleeves, and accesses. He shall provide accurate wiring diagrams to the Electrical Contractor for all equipment furnished under this Division.
- C. The mechanical Contractor shall insure that the installation of all piping, with Articles 110-16 and 384-4 of the National Electrical Code relative to proper clearances in front of and over all electrical panels and equipment. No piping will be allowed to run over electrical panel.

1.12 RESPONSIBILITY OF CONTRACTOR:

- A. The Contractor is responsible for the installation of a satisfactory piece of work in accordance with the true intent of the drawings and specifications. He shall provide, as a part of his work and without expense, all incidental items required even though these items are not particularly specified or indicated. The installation shall be made so that its several component parts will function together as a workable system and shall be left with all equipment properly adjusted and in working order. The Contractor shall familiarize the Owner's Representative with maintenance instructions as prepared by the Contractor and

shall explain and fully instruct him relative to operating, servicing, and maintenance of them. The contractor shall repair or replace all ceilings damaged or removed during the construction process.

1.13 UNFIT OR DAMAGED WORK:

- A. Any part of this installation that fails, is unfit, or becomes damaged during construction, shall be replaced or otherwise made good. The cost of such remedy shall be the responsibility of this Division.

1.14 WORKMANSHIP:

- A. Workmanship shall be the best quality of its kind for the respective industries, trades, crafts, and practices, and shall be acceptable in every respect to the Owner's representative. Nothing contained herein shall relieve the Contractor from making good and perfect work in all details in construction.

1.15 SAFETY REGULATION:

- A. The Contractor shall comply with all local and OSHA safety requirements in performance with this work. (See General Conditions). This Contractor shall be required to provide equipment, supervision, construction, procedures, and all other necessary items to assure safety to life and property.

1.16 WORK, MATERIALS, AND QUALITY OF EQUIPMENT:

- A. Unless otherwise specified, all materials shall be new and of the best quality of their respective kinds and all labor shall be done in a most thorough and workmanlike manner.
- B. Products or equipment of any of the manufacturers cited herein or any of the products approved by the Addenda may be used. However, where lists of products are cited herein, the one first listed is the design equipment used in drawings and schedules to establish size, quality, function, and capacity standards. If other than design equipment is used, it shall be carefully checked for access to equipment, electrical and control requirements, valving, and piping. Should changes or additions occur in piping, valving, electrical work, etc., or if the work of other Contractors would be revised by the alternate equipment, the cost of all changes shall be borne as work of this Division.
- C. Pipe of foreign manufacture will not be acceptable.
- D. The access to equipment shown on the drawings are the minimum acceptable space requirements. No equipment that reduces or restricts accessibility to this or any other equipment will be considered.
- E. All major items of equipment are specified in the equipment schedules on the drawings or in these specifications and shall be furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and satisfactory installation.
- F. All mechanics shall be capable journeymen, skilled in the work assigned to them. No one unskilled in the work which he is given to do shall be employed, and all work shall be executed in a skillful and workmanlike manner. All men employed upon this work shall be competent, faithful, orderly, and satisfactory to the Owner.

- G. All welders shall be certified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code, latest Edition.

1.17 PROTECTION AGAINST WEATHER AND STORING OF MATERIALS:

- A. All equipment and materials shall be properly stored and protected against moisture, dust, and wind. Coverings or other protection shall be used on all items that may be damaged or rusted or may have performance impaired by adverse weather or moisture conditions. Damage or defect developing before acceptance of the work shall be made good at the Contractor's expense.
- B. All pipe openings shall be adequately covered at all times.

1.18 CUTTING AND PATCHING:

- A. No cutting or drilling in structural members shall be done without written approval of the Architect. The work shall be carefully laid out in advance, and cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces necessary for the mechanical work shall be carefully done. Any damage to building, piping, or equipment shall be repaired by professional plasterers, masons, concrete workers, etc., and all such work shall be paid for as work of this Division.
- B. When concrete, grading, etc., is disturbed, it shall be restored to original condition as described in the applicable Division of this Specification.

1.19 FLASHING:

- A. Roof drains which penetrate roofs or exterior walls shall be flashed. All existing plumbing vents shall be extended to not less than 12 inches above the roof. Roof flashings shall be furnished by this Contractor and installed by the Roofing Contractor. Flashings shall be seamless 4-pound sheet lead or of the type required by the Roofing Contractor. Flashings shall be of the size required by the Roofing Contractor and shall extend horizontally not less than 12 inches all around. The Mechanical Contractor shall furnish flashings for all services and shall flash and counterflash all ducts through roofs and exterior walls.

1.20 CLEANING AND PAINTING:

- A. Cleaning:
 - 1. After all tests and adjustments have been made and all systems pronounced satisfactory for permanent operation, this Contractor shall clean all exposed piping, ductwork, insulated members, fixture, and equipment installed under this Section and leave them ready for painting. He shall refinish any damaged finish and leave everything in proper working order. The Contractor shall remove all stains or grease marks on walls, floors, glass, hardware, fixtures, or elsewhere, caused by his workman or for which he is responsible. He shall remove all stickers on plumbing fixtures, do all required patching up and repair all work of others damaged by this division of the work, and leave the premises in a clean and orderly condition.
- B. Removal of Debris, Etc:
 - 1. Upon completion of this division of the work, remove all surplus material and rubbish resulting from this work, and leave the premises in a clean and orderly condition.

1.21 FIRE BARRIER PENETRATIONS:

- A. Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe and duct penetrations. Seal pipe penetrations with approved 3M firestopping materials.

1.22 CONTRACT COMPLETION:

A. Incomplete and Unacceptable Work:

- 1. If additional site visits or design work is required by the Engineer or Architect because of the use of incomplete or unacceptable work by the Contractor, then the Contractor shall reimburse the Engineer and Architect for all additional time and expenses involved.

B. Guarantee:

- 1. By the acceptance of any contract award for the work herein described or shown on the drawings, the Contractor assumes the full responsibility imposed by the guarantee as set forth herein and in the General Conditions, and should protect himself through proper guarantees from equipment and special equipment Contractors and from subcontractors as their interests may appear.
- 2. The guarantee so assumed by the Contractor and as work of this Section is as follows:
- 3. That the entire mechanical system shall be quiet in operation.
- 4. That all pipes shall be perfectly free from foreign matter and pockets and that all other obstructions to the free passage of water shall be removed.
- 5. That he shall make promptly and free of charge, upon notice from the Owner, any necessary repairs due to defective workmanship or materials that may occur during a period of one year from date of Substantial Completion.
- 6. That all specialties, mechanical, and patent devices incorporated in these systems shall be adjusted in a manner that each shall develop its maximum efficiency in the operation of the system.
- 7. All equipment and the complete mechanical system shall be guaranteed for a period of one year from the date of the Architect's Certificate of Substantial Completion. Any equipment supplier not willing to comply with this guarantee period shall not submit a bid price for this project. The Contractor shall be responsible for a 100-percent guarantee for the system and all items of equipment for this period.

END OF SECTION

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SECTION 15300 - PIPING SYSTEMS, SPECIALTIES AND VALVES

PART 1 - GENERAL CONDITIONS:

- A. All pertinent sections of Section 15100, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

1.1 SCOPE OF WORK:

- A. This work includes furnishing all labor and materials to complete roof drainage systems.
- B. This work includes removal and re-installation of existing mechanical piping systems.

1.2 RELATED WORK:

- A. Refer to Section 15100 and 15400 for piping system tests.

1.3 SUBMITTALS:

- A. Submit product data in accordance with Division 1 and Section 15100. Submit the following:
 - 1. Pipe, couplings, and fittings
 - 2. Hangers and insulated pipe supports

PART 2 - PRODUCTS:

2.1 PIPE AND FITTINGS:

- A. NO PIPE OF A FOREIGN MANUFACTURER WILL BE ACCEPTABLE.
- B. All piping, fittings, flanges, etc. shall be free from defects and shall comply with the appropriate ASTM specifications.
- C. Soil, waste and vent lines 2" and larger inside building shall be standard weight cast iron. Lines smaller than 2" shall be standard weight galvanized steel pipe with drainage type fittings. All soil, waste, and vent piping below ground shall be hub and spigot standard weight cast iron with Ty-Seal neoprene gaskets. No-Hub standard weight cast iron pipe with either M-G couplings or ABI BEST couplings may also be used below ground where approved by local jurisdiction. Waste and vent joints for cast-iron waste and vent piping above ground shall be Ty-Seal neoprene gaskets or Tyler No-Hub with high torque Clamp-All stainless steel couplings and neoprene gaskets.
- D. Downspouts and rain water conductors above ground shall be either standard weight galvanized steel with Durham drainage fittings or standard weight cast iron with Ty-Seal gasketed joint fittings or Tyler No-Hub with high torque Clamp-All stainless steel couplings and neoprene gaskets. Under ground conductors shall be standard weight cast iron with joints as specified for under ground soil lines.
- E. Roof drains and storm drainage lines outside of the building shall be Utah Fire Clay tile with wedge lock mechanical joint or concrete pipe or reinforced concrete pipe where shown on drawings.

2.2 ROOF DRAIN PIPING:

- A. Downspouts and rain water conductors above ground shall be standard service weight "No Hub" cast iron with Ty-Seal gasketed joint fittings or Tyler No-Hub with high torque Clamp-All stainless steel couplings and neoprene gaskets.
- B. Schedule 40 galvanized steel pipe with drainage pattern cast iron screwed fittings (above ground only).
- C. Cleanout plugs and ferrules: Cleanouts shall be of the same size as pipe, except that cleanout plugs larger than connection with cast iron soil pipe shall consist of a long sweep quarter bend or one or two eighth bends extended to an easily accessible place, or as indicated on the drawings.
- D. Vents / Flashing:
 - 1. Vent pipes shall be flashed and made watertight at the roof as required. Vent pipes shall extend at least 12" above roof.

2.3 PIPE HANGERS AND SUPPORTS:

- A. All necessary structural members, hangers, and supports of approved design shall be provided to keep piping in proper alignment and to prevent transmission of injurious thrusts and vibrations. Pipe hangers shall generally be of the clevis pipe-clamp type with suspension bolts. All bolts shall have provision for vertical adjustment and shall be equipped with locknuts. Where concrete inserts are used, they shall be suitably reinforced. The Contractor shall obtain approval of the Architect for the location of such inserts prior to their installation. Spring and spring roller hangers shall be used wherever vertical movement of pipe occurs so that pipe and pipe supports shall always be in absolute contact. No hanger shall be welded directly to steel joists. Where joists occur, clips shall be installed and hanger rod attached to clips. All piping hung from joists shall be hung from joist panel points. Protective saddles shall be provided on all insulated piping at point of hanger. Hangers shall not contact pipe where pipe is specified to be insulated and hangers shall not penetrate insulation.
- B. The following is a schedule of maximum spacing for hangers or other supports and sizes of suspension rods for piping. In addition to the spacing listed, an additional hanger shall be provided 1 foot 0 inches from each pipe drop, rise, or turn.

<u>Pipe Size</u>	<u>Rod Diameter</u>	<u>Maximum Spacing</u>
1-1/2 in. and 2 in.	1/2 in.	9 ft.
2-1/2 in. and 3 in.	5/8 in.	10 ft.
4 in. and 6 in.	3/4 in.	10 ft.

- C. Pipes larger than 3 inches in diameter must be hung from beams. Where beam spacing is greater than a 10 foot 0 inch span for pipes, intermediate beams must be installed to support pipes. Groups of pipes anchored to floor slabs shall not exceed a 300-pound load between beams. Intermediate beams shall be provided to support pipes if a 300-pound load is exceeded.
- D. Pipes larger than 3 inches which must be supported from roof joists shall be hung from every joist (max. 7'-0" o.c.). the hangers shall be within 3 inches of panel points or the mechanical Contractor shall add a brace to the joist as per the structural general notes or as directed by the architect.

- E. Pipe hangers shall not be welded to metal pan floor. Pipe hangers shall be concrete inserts installed in holes drilled in concrete.
- F. All hangers, supports, and anchors shall be assembled with heavy pattern, hexagon carbon steel nuts.
- G. Perforated metal strap shall not be permitted.
- H. Pipes above ceilings are to be grouped together and either hung from individual rod hangers or on Unistrut trapeze hangers as shown on the drawings. Pipes are to be run as high as possible for maximum clearance of attic spaces.
- I. Risers shall be properly supported and guided at each floor. Pipe hangers, inserts, rollers, etc., and all necessary accessories required to support piping shall be provided by the Contractor, unless noted otherwise.
- J. All soil, waste, and vent stacks shall be substantially supported at the base with either a base stack fitting and concrete block or a riser clamp resting on the floor slab.
- K. All pipe hangers, inserts, trapezes, etc., and all necessary accessories required to support the piping shall be provided by this Contractor.
- L. All pipe hangers shall be installed outside of insulation on all insulated lines.
- M. Manufacturers may be Blaw-Knox, Grinnell, or Pipe Shields, Inc.
- N. Pipe Insulation
- O. Roof Drainage Lines:
 - 1. All piping above grade shall be insulated with ½-inch thick Owens-Corning ASJ-25 fiberglass pipe insulation with vapor barrier jacket. The insulation shall be applied over clean, dry pipe with all joints firmly butted together. Fittings shall be similarly insulated with a fiberglass blanket insulation covered with a premolded PVC cover. Cover to be sealed to vapor seal jacket on piping. Provide a PVC cover where pipe is exposed in finished areas. Color to be selected by Architect. All rain leader bowls shall be insulated with fiberglass insulation with a field applied vapor barrier jacket consisting of fiberglass reinforced cloth and finished with insulating cement to form a smooth surface.
- P. Insulated Pipe Supports:
 - 1. Insulated pipe supports shall be furnished and installed by the Mechanical Contractor on all insulated pipe and tubing according to the following tables. See Pipe Insulation Specification Section. Supports shall be Pipe Shields, Inc. All designations as to hanger type refer to Pipe Shields, Inc., model numbers.

Q. Horizontal Pipes:

Model Designations

Pipe Size	Maximum Horizontal Spacing	In Ring Or Clevis Hanger		On Flat Surface Roll		On Pipe	
		Cold	Hot	Cold	Hot	Cold	Hot
Through 1-1/4"	7'-0	CS-CW	CS	CS-CW	CS	CSX-CW	CSX
1-1/2	9'-0	CS-CW	CS	CS-CW	CS	CSX-CW	CSX
2 - 4	10'-0	CS-CW	CS	CS-CW	CS	CSX-CW	CSX

Notes:

7'-0 maximum spacing
 8'-0 maximum spacing
 9'-0 maximum spacing

R. Vertical Pipes: (All Pipe Sizes)

S. <u>Pipe Riser Clamp Model</u>	<u>Maximum Vertical Centers</u>
PRV	15'-0
HPRC	40'-0

T. Insulation shall be asbestos-free calcium silicate; 100 psi avg. compressive strength with a K = 0.38 BTU in/ft²/DegF/Hr. Insulating structural insert shall be asbestos-free calcium silicate; 600 psi avg. compressive strength treated with water repellent.

U. Jackets shall be galvanized sheet steel ASTM A-527; straps and load distribution plates to be carbon steel ASTM A-36; fasteners to be ASTM A-307, cadmium plated.

PART 3 - EXECUTION

3.1 PIPE INSTALLATION:

- A. All piping systems shall be installed so that they can be easily drained by means of drainage of low points of all piping without disconnecting pipe. If not specifically indicated on the drawings, the frequency of draining shall determine whether drain caps, plugs, cocks, or valves are to be used. If other than valves are contemplated, the Architect's permission must be obtained.
- B. All installed pipe lines shall be straight, free from dents, scars, and burrs, with ends reamed smooth, and shall remain straight against strains tending to cause distortion during system operation. The Contractor shall make proper allowance for pipe line expansion and contraction so that no unsightly distortion, noise, damage, or improper operation results therefrom.
- C. Piping shall run only parallel or at right angles to the walls or axes of the building and shall be neatly organized. The Contractor shall study the architectural, structural, mechanical, electrical, and other drawings to eliminate conflict of piping with other structure lighting or other services. Unless specified otherwise, no piping shall be exposed in a finished room, except in shop or storage areas. All changes in direction shall be made with fittings.
- D. No piping shall be run above any electrical panels, electrical equipment or access clearances for electrical for electrical panels or equipment. No piping shall be allowed to run through any electrical rooms.
- E. All piping shall be clean and free from acids and loose dirt when installed and shall be kept clean during the completion of the installation.
- F. Plugs of rags, wools, cottons, waste, or similar materials may not be used in plugging. All piping shall be so arranged to not interfere with removal of other equipment or devices; and to not block access to manholes, access openings, etc. Piping shall be arranged to facilitate equipment maintenance. Flanges or unions, as applicable for the type of piping specified, shall be provided in the piping at connections to all items of equipment. Piping shall be placed and installed so that there will be no interference with the installation of the air-conditioning equipment, ducts, etc. All piping shall be so installed to insure noiseless circulation. All valves and specialties shall be so placed to permit easy operation and access, and all valves shall be regulated and packed, and the glands shall be adjusted at the

completion of the work and before final acceptance. All piping shall be erected to insure proper draining. No bushings, short nipples, or street-type fittings shall be used.

- G. When insulated pipes are supported by a roller hanger they shall be protected from damage by suitable pipe covering protection saddles. Saddles shall support pipe on roller and shall be packed with insulation.

H. Pipe Sleeves:

1. All pipes passing through wall, floor, or ceiling construction shall be fitted with sleeves. Each sleeve shall extend through its respective floor, ceiling, or wall and shall be cut flush with each surface except in unfinished areas. Unless otherwise specified, sleeves shall be two pipe sizes larger in diameter than the uninsulated passing pipe. Sleeves in outside walls shall be made of galvanized steel pipe with a water-stop flange.
2. Sleeves in all finished room floors shall be left flush with floor and caulked watertight around pipe; sleeves in unfinished room floors and under cabinets shall be left standing 2 inches above finished floor. All sleeves are to be caulked watertight with sealing mastic.
3. All sleeves, except in concrete walls, shall be furnished and installed as work of this Section.
4. Sleeves for concrete or masonry shall be galvanized steel or cast iron pipe. Sleeves for stud walls shall be 26-gauge galvanized iron. These shall be furnished and installed in close cooperation with the craft involved. These sleeves shall be of sufficient size to readily clear the pipe or pipes and insulation passing through sleeve. Everything more than 6 inches in diameter or groups of multiple piping shall be approved by the Architect.
5. Bare Pipe: All pipe penetrating fire walls and floors shall be encased in adjustable sheet metal cans sized for maximum one-inch spacing between pipe and can. Spacing shall be packed on either end with UL rated ceramic fiber strip insulation. Pipe Shields, Inc., Model WFB.
6. Insulated Pipe: Same as for bare pipe, but with the addition of a 360 degree water-proofed calcium silicate insert with metal shielding, all sized to extend to a minimum of one-inch beyond wall or floor. Pipe Shields, Inc., Model WFB-CS-CW for chilled water, and Model WFB-CS for all other insulated lines.
7. Sleeve and packing shall have the same fire rating as the construction in which they are installed. Any substitutions must have passed the ASTM E-119 test per UBC 43-1 for pipe penetrations.
8. All holes required for piping through floors or walls, where sleeves have not been installed, shall be core drilled one pipe size larger in diameter than passing pipe.
9. This Division shall be responsible for the proper sizing and positioning of all necessary boxes and sleeves through walls and floors to accommodate this work. Exact location of exterior wall penetrations shall be coordinated with the Architect prior to core drilling.

3.2 ANCHORS AND GUIDES:

- A. All pipes shall be securely anchored where necessary to properly distribute expansion stresses. All vertical risers shall be anchored at the midpoint and at additional locations as required.
- B. Anchors shall be located where indicated by the drawings or required and shall be applicable to the type of piping installed. All anchor bolts, after tightening, shall be welded to the anchor frame in such a manner that all anchor bolts are effective. Additional restraining pipe supports shall be provided wherever danger of excessive pipe movement exists.

END OF SECTION

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SECTION 15400 - PLUMBING SYSTEMS**PART 1 - GENERAL**

- A. All pertinent sections of Section 15100, Division 15, are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

1.1 SCOPE OF WORK:

- A. This work shall include a complete rainwater system. All new and existing roof drains (RD's and RDO's) associated with the reroofing areas are to be provided with new stainless steel anchor bolts, washers, and nuts. Bolts, washers, and nuts are to match those being provided with the new roof drains and roof drain overflows being installed.

1.2 CODES AND STANDARDS:

- A. All work included in the scope of this specification shall conform to the latest adopted versions of applicable codes and standards, including the following:

International Plumbing Code

International Building Code

International Mechanical Code

UOSHA

IAPMO

PDI

- B. Utah State Building Board Planning and Design Criteria To Prevent Architectural Barriers for the Aged and Physically Handicapped.

1.3 SUBMITTALS:

- A. Submit product data in accordance with Division 1 and Section 15100. Submit the following:

Roof drains and accessories

Pipe materials

1.4 TESTS:

- A. The roof drainage piping shall be tested by plugging all outlets and filling the lines with water to the highest roof opening. The water level shall not drop more than 3 inches in 1 hour. All joints within the building shall be inspected for visible leaks.
- B. Defective Work: If inspection or tests show defects, such defective work or material shall be replaced or corrected and inspection and tests shall be repeated. All repairs to piping shall be made with new materials. No caulking or screwed joints or holes will be acceptable.
- C. All defects in material and workmanship which appear during the test shall be promptly remedied and the test shall be reapplied.

- D. Enclosed Piping: Any piping which is to be insulated, placed within the construction, or otherwise concealed shall be carefully tested before being permanently enclosed.
- E. Test Instruments: All testing shall be performed in the presence of the Architect or his Mechanical Engineer and shall meet with their approval. Instruments required for making the tests shall be provided by this Contractor. Relief valves set to avoid excessive pressure during testing shall be provided.
- F. Required Adjustments: Before final acceptance of the piping system as a whole, this Contractor shall make all required adjustments and shall place the entire piping system in a perfect operating condition. At the completion of the work, this Contractor shall furnish the Architect with all certificates of inspection.

PART 2 - EXECUTION

2.1 GENERAL REQUIREMENTS:

A. Existing Lines:

- 1. Any utility line uncovered during construction that is not clearly defined on the drawings shall be immediately brought to the attention of the Architect and Owner. The Owner and Architect will subsequently inform the Contractor what should be done. Relocation of any existing piping shall be done with the same material and fittings as the original installation. Damaged or removed insulation shall be repaired and/or replaced.

B. Cleanouts:

- 1. Full size cleanouts shall be installed at the base of each rainwater stack. All other cleanouts shall be installed where shown on the drawings and where required by State, local, or National Plumbing Codes.
- 2. Cleanouts shall have cast-iron bodies with threaded brass screw plugs. They shall be the full size of the pipe line in which they are installed, up to and including 4 inches. All cleanouts shall be installed in locations easily accessible for rodding. Where stacks or other piping is concealed, cleanouts shall be installed above the floor with extensions made to the finished wall surface. Cleanouts in walls shall be J. R. Smith 4402 with countersunk plugs and round stainless steel access covers. In floors, J. R. Smith 4023 square top cleanouts with countersunk plugs and round scoriated polished nickel bronze access covers with frames shall be used.
- 3. Cleanouts shall be J. R. Smith, Zurn, Wade, or Josam. J. R. Smith references are used herein.

C. Flashing and Sleeves:

- 1. Furnish and install on each pipe passing through the roof a Stoneman Stormtite four pound seamless lead flashing assembly extending horizontally not less than 12-inches all around. Flashing to have steel reinforced conical boot and counter-flashed with a hooded cast iron counter-flashing. Seal the neck of the flashing to the pipe with permaseal waterproofing compound and secure the counter-flashing to the pipe with vandal proof screws. Fill the top annular space of counter-flashing with epoxy compound. Alternate using open top models of all pipes. See specification Section 15100.

2. Sleeves for pipes passing through walls, floors or ceilings shall be as specified in Section 15300.

D. Roof Pans:

1. Roof pans shall be 4-pound lead sheet pans 40 inches square or as noted. Roof flashing members shall be placed into position but the final installation shall be made by the Roofer under supervision of this section. Floor drains with clamping collars shall be complete with pan.

E. Courses of Pipe:

1. Water pipes shall not be exposed in finished rooms except where noted on plans or as permitted by the Architect, except the finished brass supplies that are a part of the fixture trimmings. Pipes are to be run in tunnel, furred ceiling and walls, and behind or under cabinets as shown.

F. Piping Layouts:

1. Layout of piping shown on drawings is in a general sense diagrammatic as to the exact location of piping. It is to be understood by the Contractor that unforeseen conditions and obstacles at the site may not permit the running of piping as scaled from the drawings, but changes shall not be made without the written permission of the Architect.

2.2 PLUMBING FIXTURES:

- A. This Contractor shall furnish and install all fixtures shown on the drawings or specified hereinafter, shall make all parts complete, and shall leave the entire system in perfect working order. He shall clean and adjust all fixtures before leaving the job. Any damaged or cracked fixtures shall be replaced at the Contractor's expense.

PART 3 - EXECUTION

3.1 FIXTURE SCHEDULE:

(ROOF DRAINS)

RDO-1 Roof Drain: J.R. Smith 1080-R-C-C10 cast iron roof drains with flashing clamp and cast iron dome, sump receiver, (suffix-R), underdeck clamp (suffix C), 2' cast iron water dam and stainless steel anchor bolts, washers, and nuts.

DN-1 Downspout Nozzle: Smith 1770-PB cast bronze body and flange, polished bronze finish.

END OF SECTION

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SECTION 15815 - METAL DUCTS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes rectangular and round metal ducts.

1.3 DEFINITIONS

- A. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula $\text{Btu} \times \text{in.} / \text{h} \times \text{sq. ft.} \times \text{deg F}$ or $\text{W/m} \times \text{K}$ at the temperature differences specified. Values are expressed as Btu or W.

- 1. Example: Apparent Thermal Conductivity (k-Value): 0.26 or 0.037.

1.4 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select and size air-moving and - distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.5 SUBMITTALS

- A. Product Data: For duct liner and sealing materials.
- B. Welding Certificates: Copies of certificates indicating welding procedures and personnel comply with requirements in "Quality Assurance" Article.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- D. Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

1.6 QUALITY ASSURANCE

- A. Welding Standards: Qualify welding procedures and welding personnel to perform welding processes for this Project according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports; AWS D1.2, "Structural Welding Code--Aluminum," for aluminum supporting members; and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

- B. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.
- C. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.
- D. Comply with NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," Chapter 3, "Duct System," for range hood ducts, unless otherwise indicated.
- E. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealant and firestopping materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle sealant and firestopping materials according to manufacturer's written recommendations.
- C. All ductwork lined or bare shall be protected from corrosion and contamination caused by moisture and dirt. All ductwork and openings to be protected with reinforced plastic sheathing until assembled in place. All open ends of ductwork to be covered.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, exposed matte finish.

2.2 DUCT LINER

- A. General: Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard."
- B. Materials: ASTM C 1071 with coated surface exposed to airstream to prevent erosion of glass fibers.
 - 1. Thickness: 1 inch, unless otherwise indicated.
 - 2. Thermal Conductivity (k-Value): 0.26 at 75 deg F mean temperature.
 - 3. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM C 411.
 - 4. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
 - 5. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
 - a. Tensile Strength: Indefinitely sustain a 50-lb- tensile, dead-load test perpendicular to duct wall.

- b. Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch into airstream.
 - c. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.
 - d. Fasteners are not to compress liner.
6. All edges shall be coated.

2.3 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
- 1. Joint and Seam Tape: 2 inches wide; glass-fiber fabric reinforced.
 - 2. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.
 - 3. Joint and Seam Sealant: One-part, non-sag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
 - 4. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.4 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, cast in place inserts, or structural-steel fasteners appropriate for building materials.
- B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.
- 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.
 - 2. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

2.5 RECTANGULAR DUCT FABRICATION

- A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
- 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
 - 2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
- D. Static-Pressure Classification: Unless otherwise indicated, construct ducts to the following:
- 1. Supply ducts: 2-inch wg.
 - 2. Return and transfer ducts: 2-inch wg, negative

- E. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of unbraced panel area, unless ducts are lined.

2.6 SHOP APPLICATION OF LINER IN RECTANGULAR DUCTS

- A. Adhere a single layer of indicated thickness of duct liner with 90 percent coverage of adhesive at liner contact surface area. Multiple layers of insulation to achieve indicated thickness are prohibited.
- B. Apply adhesive to liner facing in direction of airflow not receiving metal nosing.
- C. Butt transverse joints without gaps and coat joint with adhesive.
- D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
- E. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely around perimeter; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
- F. All rectangular low-pressure supply air, return air, and transfer air ducts shall be lined with 1 inch of fiberglass insulation. Duct dimensions shall be increased 2 inches on each side from those shown on drawings to accommodate insulation.

2.7 ROUND AND FLAT-OVAL DUCT FABRICATION

- A. General: Diameter as applied to flat-oval ducts in this Article is the diameter of the size of round duct that has a circumference equal to perimeter of a given size of flat-oval duct.
- B. Round Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- C. Flat-Oval Ducts: Fabricate supply ducts with standard spiral lock seams or with butt-welded longitudinal seams according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

PART 3 - EXECUTION

3.1 DUCT INSTALLATION, GENERAL

- A. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.
- B. Construct and install each duct system for the specific duct pressure classification indicated.
- C. Install ducts with fewest possible joints.
- D. Install fabricated fittings for changes in directions, changes in size and shape, and connections.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct.

- F. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.
- J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- K. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches.
- M. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire and smoke damper, sleeve, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Firestopping."

3.2 SEAM AND JOINT SEALING

- A. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Where ducts pass through interior partitions and exterior walls,
- C. Pressure Classification Less Than 2-Inch wg: Transverse joints.
- D. Seal externally insulated ducts before insulation installation.
- E. Seal all seams and joints of shower room exhaust duct work water tight with silicone. Slope duct down to exhaust grille.

3.3 HANGING AND SUPPORTING

- A. Install rigid round, rectangular, and flat-oval metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

3.4 CONNECTIONS

- A. Connect equipment with flexible connectors according to Division 15 Section "Duct Accessories."

- B. For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

3.5 FIELD QUALITY CONTROL

- A. Disassemble, reassemble, and seal segments of systems as required to accommodate leakage testing and as required for compliance with test requirements.
- B. Conduct tests, in presence of Architect, at static pressures equal to maximum design pressure of system or section being tested. If pressure classifications are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
- C. Determine leakage from entire system or section of system by relating leakage to surface area of test section.
- D. Maximum Allowable Leakage: Comply with requirements for Leakage Classification 3 for round and flat-oval ducts, Leakage Classification 12 for rectangular ducts in pressure classifications less than and equal to 2-inch wg (both positive and negative pressures), and Leakage Classification 6 for pressure classifications from 2- to 10-inch wg.
- E. Remake leaking joints and retest until leakage is less than maximum allowable.
- F. Leakage Test: Perform tests according to SMACNA's "HVAC Air Duct Leakage Test Manual."

3.6 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect the system. Vacuum ducts before final acceptance to remove dust and debris.

3.7 DUCT LINER APPLICATION

- A. Insulation thickness: 1 inch.

END OF SECTION 15815

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SECTION 15820 - DUCT ACCESSORIES**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. Manual-volume dampers.
2. Turning vanes.
3. Flexible ducts.
4. Duct accessory hardware.
5. High efficiency take-offs.
6. Concealed damper regulators.

1.3 SUBMITTALS

- A. Product Data: For the following:

1. Manual-volume dampers.
2. Duct-mounted access doors and panels.
3. Flexible ducts.
4. Concealed damper regulators.

- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection. Detail the following:

1. Special fittings and manual- and automatic-volume-damper installations.
2. Fire- and smoke-damper installations, including sleeves and duct-mounted access doors and panels.

- C. Product Certificates: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static-pressure loss, dimensions, and weights.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with the following NFPA standards:

1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

1.5 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets, commercial quality, with oiled, exposed matte finish.
- C. Aluminum Sheets: ASTM B 209, Alloy 3003, Temper H14, sheet form; with standard, one-side bright finish for ducts exposed to view and mill finish for concealed ducts.
- D. Extruded Aluminum: ASTM B 221, Alloy 6063, Temper T6.
- E. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 MANUAL-VOLUME DAMPERS

- A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 1. Pressure Classifications of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- B. Small Volume Dampers: Dampers smaller than 4 square feet of face area. Multiple- or single-blade, opposed-blade design as indicated, low-leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
 1. Aluminum Frames: Hat-shaped, 0.063-inch- thick, extruded-aluminum channels; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
 2. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
 3. Blade Axles: Nonferrous.
 4. Tie Bars and Brackets: Aluminum.
- C. Jackshaft: 1-inch- diameter, galvanized steel pipe rotating within a pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 1. Length and Number of Mountings: Appropriate to connect linkage of each damper of a multiple-damper assembly.
- D. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

- E. Each volume damper and splitter damper concealed above an inaccessible ceiling, etc., shall be provided with a shaft extended through the ceiling, to which shall be attached a chrome-plated or painted Ventlock No. 666 concealed damper regulator. No. 680 Ventlock miter gears shall be used where necessary.

2.3 TURNING VANES

- A. Fabricate single blade vanes to comply with SMACNA's "HVAC Duct Construction Standards-Metal and Flexible."
- B. Acoustic Turning Vanes: Fabricate of airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.4 FLEXIBLE DUCTS

- A. General: Comply with UL 181, Class 1.
- B. Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch- thick, glass-fiber insulation around a continuous inner liner.
 - 1. Reinforcement: Steel-wire helix encapsulated in inner liner.
 - 2. Outer Jacket: Glass-reinforced, silver Mylar with a continuous hanging tab, integral fibrous-glass tape, and nylon hanging cord.
 - 3. Inner Liner: Polyethylene film.
- C. Pressure Rating: 6-inch wg positive, 1/2-inch wg negative.
- D. Flexible duct connections from the main trunk ducts to diffuser boots shall be furnished and installed as shown on the drawings. Flexible ducts shall have compression fittings on both ends. Flexible ducts shall connect to trunk duct with high efficiency takeoffs. A balance damper with locking quadrant will be provided downstream of take-off from trunk duct.
- E. Ducts shall conform to the requirements for Class I connectors when tested in accordance with "Standard for Factory Made Air Ducts Materials and Air Duct Connectors" (UL 181). Ducts shall also pass the 15 minute U.L. flame penetration test as specified in the UL 181 Standard.

2.5 ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.
- B. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches to suit duct size.
- C. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

DUCT ACCESSORIES

- A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.
- B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.
- C. Provide test holes at fan inlet and outlet and elsewhere as indicated.
- D. Install duct access panels for access to both sides of duct coils. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.
 - 1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
 - 2. Install access panels on side of duct where adequate clearance is available.
- E. Label access doors according to Division 15 Section "Mechanical Identification."
- F. Where flexible duct is indicated, use insulated flexible duct for supply air return and exhaust air.

3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Final positioning of manual-volume dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

END OF SECTION 15820

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SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes ceiling diffusers, registers, and grilles.

1.3 DEFINITIONS

- A Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.
- B Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.
- C Register: A combination grille and damper assembly over an air opening.

1.4 SUBMITTALS

- A Product Data: For each model indicated, include the following:
 - 1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
 - 2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
 - 3. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
 - 4. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.
- B Coordination Drawings: Reflected ceiling plans and wall elevations drawn to scale to show locations and coordination of diffusers, registers, and grilles with other items installed in ceilings and walls.
- C Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for diffusers, registers, and grilles with factory-applied color finishes. Colors to be off-white, unless otherwise selected by Architect during submittal stage.
- D Samples for Verification: Of diffusers, registers, and grilles, in manufacturer's standard sizes, showing the full range of colors. Prepare Samples from the same material to be used for the Work.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated.
- B. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Air Factors
 - 2. Krueger
 - 3. Metal Aire
 - 4. Nailor
 - 5. Price
 - 6. Titus

2.2 REGISTERS, GRILLES, & DIFFUSERS

- A. General: The frames for all registers, grilles, and diffusers shall match type of ceiling where they are to be installed. Special frames shall be provided for narrow T-bar ceilings. Refer to reflected ceiling plan and other specification divisions for ceiling type.
 - 1. Linear ceiling diffusers shall be Titus ML with 1-inch blade spacing unless scheduled otherwise, with border type 9A with end cap for lay-in ceilings, and border type 2A with end border for surface mount; baked enamel finish, insulated supply plenum. Blades to be adjustable for direction and volume control.
 - 2. Ceiling return-air grilles in other than lay-in ceiling shall be Titus 8F with perforated faceplate, baked enamel finish.

2.3 SOURCE QUALITY CONTROL

- A. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.4 CLEANING

- A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION

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SECTION 16000 - GENERAL PROVISIONS, ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions and Division 1 Specification Sections apply to work of this section and all other Division 16 specification sections.
- B. This section applies to all Division 16 specification sections.

1.02 SUMMARY

- A. This section includes general administrative and procedural requirements for electrical installations to expand the requirements of the General Conditions and Division 1 Specification Sections.

1.03 STANDARDS

- A. The following industry standards are considered minimum requirements for electrical work and are made a part of the contract documents:
 - 1. National Electrical Code, 2005 Edition (NEC)
 - 2. Electrical Ordinances of Local Governing Authority
 - 3. Utah State Fire Marshal's Rules and Regulations
 - 4. International Building Code
 - 5. International Fire Code
 - 6. Underwriters Laboratories (UL) Standards
 - 7. American National Standards Institute (ANSI)
 - 8. National Electrical Manufacturer's Association (NEMA)
 - 9. National Fire Protection Association (NFPA) Standards
 - 10. Regulations of American Standards Association
- B. If any conflict occurs between these rules and the contract documents or between the plans and specifications, notify the Architect promptly in writing. Do not proceed with any work in conflict until a solution is approved in writing by the Architect.

1.04 WORKMANSHIP

- A. All Electrical Work of any nature shall be performed by qualified electricians, experienced in the type of work to be performed and licensed with the State of Utah. Electricians shall show their license upon request of the Owner, Architect and/or their representatives.

1.05 FEES AND PERMITS

- A. Obtain all necessary fees, permits and inspections in accordance with the General Conditions and Division 1 Specifications. Coordinate requirements with the General Contractor.

1.06 ELECTRICAL WORK INCLUDED

- A. The basic contract work includes all labor, material, tools, transportation, equipment, and superintendence specified, indicated on the drawings or necessary to make a complete installation of, but not limited to, the following:
 - 1. Appliances, apparatus and materials not specifically noted on drawings or mentioned herein, but which are necessary to make a complete working installation of all electrical systems required for the project.
 - 2. Hangers, anchors, sleeves, chases, supports and fittings as may be required and as indicated.

3. Complete electric service with branch panel breakers and branch circuits for power with raceway system and outlet boxes.
4. Snow Melt Heat Cable System, complete with all equipment in operative condition.

1.07 SUBSTITUTIONS

- A. Material or products specified by name of manufacturer, brand or trade name or catalogue reference will be the basis of the bid and furnished under the contract unless changed in writing by the Architect. Where two or more materials are named, the choice of these will be optional with the Contractor.
- B. Submit requests for substitution in writing to the Architect, with copy to the Engineer, in accordance with the General Conditions.

1.08 ACCURACY OF DATA

- A. Data given herein and on the drawings are as exact as could be secured, but their absolute accuracy is not guaranteed. Specifications and drawings are for the assistance and guidance of the Contractor.
- B. Electrical drawings are diagrammatic, but will be followed as closely as actual building construction and work of other contractors will permit. All deviations from the drawings required to make the Electrical Work conform to the building as constructed and to the work of other contractors will be made by the Contractor as approved by the Architect.

1.09 VISIT THE SITE

- A. Contractors are assumed to have visited the site and thoroughly acquainted themselves with conditions affecting the proposed work. Verify existing conditions and measurements at the building before beginning work and immediately notify the Architect of any discrepancies.

1.10 SHOP DRAWING SUBMITTALS

- A. As soon as possible after contract award, submit shop drawings for review in accordance with the General Conditions and Division 1 Specifications.
- B. Submit shop drawings in three ring loose-leaf binder.
- C. Divide Electrical equipment into subsections of common equipment such as wiring devices, lighting fixtures, panelboards, starters, etc.. Provide a complete equipment list at the beginning of each subsection.
- D. Provide manufacturers' catalogue and/or descriptive literature indicating specific model and/or catalog numbers, options, accessories and modifications for the following items:
 1. Snow Melt Heat Cable System
- E. Above list is considered minimum. Additional items may be required to be submitted for review.
- F. Refer to individual Specification Sections for additional Shop Drawing Submittal requirements.

1.11 RECORD DRAWINGS

- A. Provide As-Built Record Drawings in accordance with the General Conditions and Division 1 Specifications.
- B. Indicate location and routing of all underground raceways on the As-Built Record Drawings by dimension to permanent structures such as buildings, sidewalks, curbs, etc.
- C. Indicate all changes made to the drawings such as changes in fixture and outlet location, changes

in circuit routing and circuit numbering, etc. Include all changes by Addenda, Change Order, Supplemental Instruction or verbal instruction.

- D. Refer to individual Specification Sections for additional Record Drawing requirements.

1.12 OPERATION AND MAINTENANCE MANUALS

- A. Provide Operation and Maintenance Manuals in accordance with the General Conditions and Division 1 Specifications.
- B. Include manufacturers' catalog and/or descriptive literature of equipment actually installed. Clearly indicate on literature the specific model and/or catalog numbers of equipment installed, including all options, accessories and/or modifications.
- C. All copies of literature will be new, clean and clearly legible. Sheets used for shop drawing submittals with review stamp, remarks, etc., will not be acceptable.
- D. Divide Electrical equipment into subsections of common equipment such as wiring devices, lighting fixtures, panelboards, starters, etc.. Provide a complete equipment list and recommended maintenance schedule at the beginning of each subsection.
- E. Refer to individual Specification Sections for additional Operation and Maintenance Manual requirements.

1.13 WARRANTY

- A. Provide Warranty for Electrical Work in accordance with the General Conditions and Division 1 Specifications.
- B. Provide manufacturer's warranty for all equipment which the manufacturer normally provides a warranty in excess of twelve months. Refer to individual Specification Sections for extended warranty requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials and equipment for which U.L. Standards have been established, will be listed by and bear the label of Underwriters Laboratories, Inc..
- B. All materials will be new and bear the manufacturer's name, trade name and catalog or model numbers. Similar items will be of the same manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation of materials will comply with all codes and be accomplished with good workmanship in the judgement of the Architect and Engineer.

3.02 COOPERATION WITH OTHER CONTRACTORS

- A. Cooperate with other contractors doing work on the building as may be necessary for the proper execution of the work of various trades employed in construction of the building.
- B. Refer to architectural, structural and mechanical drawings, for construction details, and coordinate the electrical work with that of other contractors to the end that unnecessary delays and conflicts will be avoided.

3.03 MATERIAL HANDLING

- A. Use all means necessary to protect materials before, during and after installation and to protect the installed work and materials of all other trades.
- B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

3.04 CUTTING AND REPAIRING

- A. Provide all required digging, cutting, etc. incidental to the Electrical Work. Make required repairs thereafter to the satisfaction of the Architect.
- B. Do not cut into any major structural element, beam or column, without written approval of the Architect.
- C. Install the Electrical Work to proceed with other trades in order to avoid unnecessary cutting of the construction.
- D. Perform all excavating, trenching and backfill required for electrical work in accordance with Division 2 Specifications.

3.05 CONSTRUCTION REVIEW

- A. The Owner, Architect and/or Engineer will perform construction review throughout the construction of the project. The construction review does not relieve the contractor from the responsibility of providing all materials and performing the work in accordance with the Contract Documents.
- B. Notify the Architect in writing, giving ample notice, at the following stages of construction and allow the Owner, Architect and/or Engineer to review the installed work.
 - 1. When underground electrical work is complete, before backfilling, including work under floor slabs.
 - 2. When all electrical rough-in is complete, but not covered.
 - 3. Pre-Final, upon completion of all electrical work.
 - 4. Final, upon completion of all items noted in the Pre-Final Construction Review Report.
- C. Prerequisite for Final Electrical Construction Review:
 - 1. Electrical Engineer/Consultant must be present.
 - 2. Electrical Contractor's job foreman must be present.
 - 3. DFCM Electrical Specialist must be present.
 - 4. Service Disconnect and all Panelboard Enclosures must be open.
 - 5. Clear access must be provided to all devices and equipment.
 - 6. All panels, disconnects, etc. must be labeled and typed panel index cards installed.
 - 7. Snow Melt Heat Cable must be energized and operable.
 - 8. Contractor must have pad and pencil to list all deficient items.
 - 9. Make all corrections and adjustments after the Final Construction Review, not during. Items requiring correction will appear on the Final Construction Field Report.
 - 10. Contractor must have all required keys to provide access to all panels and doors.
- D. Test all systems and equipment provided and/or connected under the Contract for short circuits, ground faults, proper neutral connections and proper operation in the presence of the Owner, Architect and/or Engineer.
- E. The entire construction will be installed in accordance with the contract documents and be free of mechanical and electrical defects prior to final acceptance of the work.

* END OF SECTION 16000 *

SECTION 16060 - MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.
- B. Division 2 Demolition Sections.

1.02 SCOPE

- A. Remove electrical equipment and wiring systems and make required extensions and reconnections as shown on Drawings and specified herein.
- B. Repair all damage resulting from demolition and extension work.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Provide new materials and equipment for patching and extending work as specified in the appropriate Specification Section for the materials and equipment involved.
- B. Where materials or methods not included in the Specifications are required, provide materials and methods in accordance with normal construction industry standards and as approved by the Architect and/or Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Field verify existing measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition Drawings are based on field observation of existing surface conditions and available existing building electrical drawings. Report discrepancies to Owner and/or Architect before disturbing existing installation.
- D. All demolition and extension work is not necessarily indicated on Drawings. Include all such work without additional cost to Owner.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Coordinate utility service outages with Utility Company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use electricians experienced in such operations.
- D. Protect all existing electrical equipment to remain from damage during demolition and new construction. Survey all existing equipment prior to beginning work and document in writing any existing damage to existing equipment.

3.03 DEMOLITION

- A. Coordinate with Owner for equipment and materials to be removed by Owner or salvaged by the contractor for Owner. Place salvaged equipment and materials in storage at the project site as directed by the Owner.
- B. Legally dispose of all removed equipment and materials not salvaged for the Owner.
- C. Remove abandoned wiring to source of supply, i.e. panelboard, circuit breaker, etc..
- D. Remove accessible abandoned conduit, cables, junction boxes, etc., including above accessible ceilings. Cut conduit flush with walls and floors.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlet boxes and conduit servicing them where indicated on drawings. Provide blank cover for abandoned outlets which are not indicated to be removed.

3.04 EXTENSION OF EXISTING ELECTRICAL WORK

- A. Reconnect existing equipment where demolition interrupts existing branch circuits or feeders to the equipment.
- B. Repair adjacent construction and finishes damaged during demolition and extension work to match surrounding surfaces.
- C. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
- D. Extend existing installations using materials and methods as specified for new work. Remove and replace existing installations which are not compatible with new work.

3.05 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide new typed circuit directory showing revised circuiting arrangement.
- C. Luminaries: Remove existing luminaries for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps and broken electrical parts.

3.06 INSTALLATION

- A. Install relocated materials and equipment as required for new materials and equipment.

3.07 OUTAGES

- A. Maintain Existing Electrical Systems in service until new systems are complete and ready for service. Disable systems only to make switchovers and connections. Minimize outage duration.
- B. Obtain permission from Owner and/or Architect before partially or completely disabling systems in accordance with Division 1 Specification Sections.

* END OF SECTION 16060 *

SECTION 16110 - RACEWAYS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

- A. Provide a complete raceway system for all wiring as shown on the drawings and as specified herein.

PART 2 - PRODUCTS

2.01 RACEWAYS

- A. Provide minimum 3/4" trade diameter raceways for all wiring systems.
- B. Do not use aluminum conduit, intermediate steel conduit (IMC), BX cable, MC cable, Flexible Non-metallic Tubing, NM cable, Direct Burial Cable or any other wiring methods not allowed by this specification unless approved in writing by the Architect and/or Engineer.

2.02 ABOVEGROUND RACEWAYS

- A. Provide Electrical Metallic Tubing (EMT), galvanized inside and out, for raceways not subject to permanent moisture or damage.
- B. Provide Galvanized Rigid Steel Conduit (GRC) where raceways are subject to permanent moisture such as underground, or damage such as vehicular traffic, etc..

2.03 UNDERGROUND RACEWAYS

- A. Provide Schedule 40 PVC electrical conduit in earth or in concrete in contact with earth.
 - 1. Provide a separate ground wire in all PVC conduits, except main electrical service conduits.
 - 2. Provide Galvanized Rigid Steel Conduit (GRC) for all bends greater than 22 degrees in PVC conduits.
 - 3. Do not use PVC conduit above grade nor for penetrations through structural elements such as foundation walls, floor slabs, etc..
- B. Provide Galvanized Rigid Steel Conduit (GRC) for conduit penetrations through floor slab or grade to extend minimum 12" above floor or grade.
- C. Provide Galvanized Rigid Steel Conduit (GRC) for conduit penetrations through foundation walls to extend minimum 36" beyond the foundation wall.
- D. Corrosion protect all galvanized rigid steel conduit (GRC) installed in earth or in concrete in contact with earth with two (2) half-lapped layers of 0.010" thick approved waterproof PVC tape equal to Scotch No. 50 or use factory PVC coated rigid steel conduit with all field joints coated after installation.

2.04 FLEXIBLE RACEWAY CONNECTIONS

- A. Provide Flexible Steel Conduit for final connection to lay-in light fixtures, motors and other

equipment subject to vibrations or movement, not to exceed 6 feet for fixture connections and 3 feet for motor and equipment connections.

- B. Provide liquid-tight flexible steel conduit outside and in wet, humid, corrosive and oily locations.
 - 1. Provide Sunlight Resistant liquid-tight flexible steel conduit outdoors.
- C. Provide a ground conductor in all flexible steel conduit.
- D. Flexible Steel Conduit may be used where misalignment or cramped quarters exist only with prior approval of the Architect and/or Engineer.

2.05 CONDUIT FITTINGS

- A. Provide steel compression type or steel set screw type fittings for Electrical Metallic Tubing.
- B. Provide malleable iron clamp type fittings for Flexible Steel Conduit.
- C. Provide steel compression type fittings for Liquid-Tight Flexible Steel Conduit.
- D. Provide threaded fittings for GRC conduit. Provide double locknuts and plastic bushing for GRC conduit terminations or provide boxes and enclosures with threaded hubs.
- E. Provide liquid-tight and gas-tight conduit fittings underground using fittings and PVC cement as recommended by the conduit manufacturer.
- F. Provide steel rain-tight, compression type fittings for all conduit installed outside and in wet, humid, corrosive and oily locations.
- G. Provide Insulated Throat Connectors for all conduit terminations 1" diameter and smaller. Provide insulating bushings for all conduit terminations 1-1/4" diameter and larger.
- H. Provide Grounding Bushings bonded to the electrical system ground:
 - 1. On each end of all service conduits.
 - 2. On each end of all feeder conduits in which a separate ground conductor is installed.
 - 3. On each end of all conduits used to protect ground conductors.
 - 4. On all conduit terminations installed in concentric or eccentric knockouts or where reducing washers have been installed.
- I. Do not use cast metal or indenter type fittings. Do not use screw-in type fittings for Flexible Steel Conduit. Do not use spray (aerosol) PVC cement.

2.06 RACEWAY SEALS

- A. Seal all conduit penetrations through fire rated walls, ceilings and floors with a UL classified fire barrier system in accordance with Division 7 Specification Requirements.
 - 1. As manufactured by Scotch 3M or Nelson Electric which will provide an immediate fire seal, require no curing time, and emit no hazardous or toxic fumes.
- B. Seal all conduit penetrations through airtight spaces and plenums with an approved mastic compound acceptable to the Architect to prevent air leakage.

2.07 ROOF PENETRATIONS

- A. Provide Galvanized Steel or Lead roof jacks of suitable style and material for all conduit penetrations through roof to provide a weathertight seal in accordance with the applicable Roofing Specification Sections. Coordinate style, material and installation with the roofing contractor.

2.08 PULL BOXES

- A. Provide pull boxes or conduit bodies in accessible locations where required to reduce the number of bends in the conduit run to less than 360 degrees and at points not exceeding 100 feet in long branch circuit conduit runs.
 - 1. Indicate exact location of pull boxes and conduit bodies on the As-Built Record Drawings.

2.09 PULL STRING

- A. Provide a nylon or polypropylene pull string with not less than 200 lb tensile strength in all spare conduits and conduits installed for use by others. Provide a hard cardboard tag for each raceway to indicate location of the opposite end of the raceway.

PART 3 - EXECUTION

3.01 SUPPORTS

- A. Securely support all raceways with full pipe straps, hangers, or ceiling trapeze directly from building structure such as roof trusses, beams, floor joists, etc., in accordance with Specification Section 16190 - Supporting Devices.
 - 1. Do not support raceways from other electrical systems or mechanical systems.
- B. Provide supports at 5'-0" on center with a minimum of two supports for each ten foot length of conduit or fraction thereof up to 6 feet.
- C. Provide a support within 12" of each coupling, fitting, box, enclosure and bend.
 - 1. Install supports at vertical to horizontal conduit bends on the upper side of the bend.
- D. Provide support method for parallel conduit runs as follows:

<u>No. of Conduits</u>	<u>3/4" to 1-1/4" Conduits</u>	<u>1-1/2" and larger Conduit</u>
2	Full Strap, Clamp or Hanger	Mounting Channel
3 or More	Mounting Channel (Trapeze)	Mounting Channel

3.02 INSTALLATION

- A. Raceway layouts on the drawings are generally diagrammatic and the exact routing of raceways will be governed by structural conditions and the work of other contractors.
- B. Install raceways concealed within finished ceilings, walls and floors except where exposed raceways are specifically shown on the drawings or permitted by the Architect.
- C. Install exposed raceways parallel with or perpendicular to walls and ceilings, with right angle turns consisting of symmetrical bends or conduit bodies equal to Crouse-Hinds "Condulet". Avoid all bends and offsets where possible.
 - 1. Paint exposed raceways to match surrounding surfaces, except raceways in unfinished areas such as mechanical rooms and electrical rooms will not be required to be painted.
- D. Install raceways minimum 12" from insulation of hot water piping, steam piping and other systems or equipment with temperatures in excess of 104° F (40° C).
- E. Make all field bends and offsets with a radius not less than allowed by the National Electrical Code for the type of raceway system.
 - 1. Do not install bends or offsets which are flattened, kinked, rippled or which destroy the smooth internal bore or surface of the conduit.
- F. Cap the open ends of raceways during construction to prevent the accumulation of water, dirt or concrete in the raceways. Thoroughly clean raceways in which water or other foreign matter has been permitted to accumulate or replace the raceway where such accumulation cannot be

removed by a method approved by the Architect and/or Engineer.

- G. Install raceways for parallel feeder conductors with the same physical characteristics and in exactly the same manner. Maintain spacing between raceways for entire run.
- H. Do not install raceways which have been crushed or deformed in any manner.
- I. Do not install wiring until work which might cause damage to the wires or raceways has been completed.

3.03 UNDERGROUND RACEWAY INSTALLATION

- A. Install underground raceways within buildings minimum 4" below the bottom of the concrete floor slab to the top of the raceway.
- B. Install underground raceways outside of building minimum 24" below finished grade to the top of the raceway.
 - 1. Provide a plastic red magnetic warning ribbon stating "CAUTION - BURIED ELECTRICAL" 12" directly above the top of the raceway.
- C. Use select granular fill, free of rocks or hard clumps with sharp or angular edges, for the first 6" of backfill around underground raceways including raceways below concrete floor slabs. Provide imported sand backfill where required by Division 2 Specifications or where excavated materials are not suitable.
- D. Coordinate location of underground raceways with the General Contractor to avoid areas where raceways may be damaged by subsequent installation of trees, shrubbery or other landscape vegetation.
- E. Install underground raceways minimum 3'-0" from parallel runs, and minimum 1'-0" from perpendicular runs, of underground natural gas and propane lines.
- F. Do not use torches to heat PVC conduit for field bends. Do not install PVC conduit that has been scorched by heating for bends.

* END OF SECTION 16110 *

SECTION 16120 - CONDUCTORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

- A. Provide all conductors for power and lighting as shown on drawings and as specified herein.

PART 2 - PRODUCTS

2.01 CONDUCTORS

- A. Provide Copper building wire, minimum #12 AWG, with type THHN/THWN or XHHW 600 volt insulation, except as otherwise noted on the drawings or required by NEC.
 - 1. Provide conductors in underground raceways with insulation approved for wet locations such as type THWN or XHHW.
- B. Provide stranded conductors for wires #8 AWG and larger and for terminal connections to all motors. Stranded or solid conductors may be used for sizes smaller than #8 AWG at the contractor's option.
- C. Provide conductors rated 90° C minimum in wiring channels of Fluorescent and High Intensity Discharge lighting fixtures.
- D. Provide conductors with surface printed identification showing conductor size and material, insulation type, voltage rating and approvals at regularly spaced intervals of 24".
- E. Do not use sizes smaller than #12 AWG in branch circuits carrying load. Circuits requiring larger sizes to meet voltage drop conditions, etc., are indicated on the drawings.
 - 1. Where branch circuit homeruns indicate conductor size, use that size conductor for the entire branch circuit, including switch legs, etc.
- F. Do not use aluminum conductors.

2.02 SPLICES

- A. Provide Ideal wirenuts or Scotchlock spring connectors for all conductor splices #8 AWG and smaller. Provide split-bolt or compression type connectors for all conductor splices larger than #8 AWG.
- B. Provide splices which are UL listed for the type, quantity and size of the conductors to be spliced.
- C. Provide all splices with insulation at least equal to that of the conductor.
- D. Provide watertight splices in junction or outlet boxes located outside and in wet locations. Provide heat shrink insulating kits or use connectors pre-potted with an approved waterproof compound.
- E. Splice conductors only in approved boxes. Do not splice conductors in conduit bodies.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install all conductors in approved raceway systems.
- B. Install conductors continuous without splice between outlet boxes, devices and panelboards.
 - 1. Provide suitable junction boxes in readily accessible locations where splices are necessary at intermediate points. Indicate exact location of all boxes on the As-Built Record Drawings.
- C. Do not install wiring until work which might cause damage to the wires has been completed.

3.02 COLOR CODING

- A. Color code all wiring at each enclosure and box where conductors are accessible and at each splice, tap or termination by means of colored conductor insulation.
 - 1. For conductors #6 AWG and larger, colored self-adhesive tape with the appropriate color designations may be used.
- B. Color code each conductor of each circuit as follows.
 - 1. Ground: Green or Bare Copper
 - 2. 120/208 Volt, 3 Phase, 4 Wire System
 - a. Phase A - Black
 - b. Phase B - Red
 - c. Phase C - Blue
 - d. Neutral - White
 - 3. Match existing conductor color coding if different than above.
- C. Color code switch legs and travelers according to phase with colors other than used for phase conductors, to be consistent throughout the project.

3.03 MULTI-WIRE BRANCH CIRCUITS

- A. Where a common neutral is run for multi-wire branch circuits, connect phase conductors to separate phases such that the neutral conductor will carry only the unbalanced current. Use neutral conductors of the same size as the phase conductors unless specifically noted otherwise.
- B. Do not install more than three phase conductors in any raceway except where specifically shown on the drawings or approved by the Architect and/or Engineer.

3.04 PHASE ROTATION

- A. Phase rotation for Three Phase System will be A leads B Leads C from front to back, from left to right or from top to bottom as viewed from the front of the enclosure.

* END OF SECTION 16120 *

SECTION 16130 - ELECTRICAL BOXES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

- A. Provide junction boxes and outlet boxes at each outlet, fixture and other device location as shown on drawings and as specified herein.

PART 2 - PRODUCTS

2.01 OUTLET AND DEVICE BOXES

- A. Provide galvanized or cadmium plated sheet steel electrical boxes in indoor dry locations, of the most suitable size and shape for the conditions encountered and in accordance with NEC requirements for the number of conductors allowed.
- B. Provide minimum 4" Square or Octagonal, 1-1/2" Deep Boxes unless specifically indicated otherwise on the drawings.
 - 1. Provide minimum 4" Square or Octagonal, 2-1/8" Deep Boxes where Three (3) conduit connections are required.
 - 2. Provide minimum 4-11/16" Square, 2-1/8" Deep Boxes where Four (4) or more conduit connections are required.
 - 3. Provide gang boxes where more than one device is located at the same point.
 - 4. Boxes smaller than 4" Square or Octagonal, even though of equivalent cubic inch capacity, are not acceptable.
- C. Provide Type FD cast metal boxes outside, in wet, humid or corrosive locations and where exposed to damage such as vehicular traffic.
- D. Confer with the various equipment suppliers and either use or properly provide for boxes which are furnished with the equipment, such as speakers, horns, bells, etc..
- E. Do not use "THRU-THE-WALL" boxes, sectional (gangable) boxes or non-metallic boxes.

2.02 JUNCTION BOXES

- A. Provide junction boxes as specified for outlet and device boxes except that boxes 6" square and larger may be painted sheet steel.

2.03 BOX ACCESSORIES

- A. Provide fittings, plaster rings, cover plates and other accessories suitable for the purpose and location of each box.
- B. Provide plaster rings which are minimum 1/8" deeper than wall covering for flush mounted boxes (i.e. use 3/4" plaster ring for 5/8" gypsum board wall covering) such that plaster ring will be flush with finished face of wall.
- C. Provide industrial raised covers for surface mounted outlet and device boxes.
- D. Provide masonry rings for boxes installed in brick walls, concrete block walls and in walls with tile finish.

- E. Provide ceiling outlet boxes with standard 3/8" fixture stud where required for fixture to be installed.

PART 3 - EXECUTION

3.01 SUPPORTS

- A. Support each box from the building structure independent of the raceway system.
- B. Support flush mounted wall boxes with metal bar hangers or metal stud backing behind the box secured to wall studs.
- C. Support flush mounted ceiling boxes with metal bar hangers secured to ceiling support system or threaded rod hangers secured to structure.
 - 1. Secure boxes for box supported fixtures to the building structure with suitable anchors capable of supporting not less than 200 lbs or 4 times the fixture weight, whichever is greater.
- D. Secure surface mounted boxes to building structure with minimum of 2 screws or bolts as required.
- E. Secure boxes in concrete block walls in place prior to pouring grout such that installation of grout will not displace the box and the box will be flush with the finished face of the wall.
- F. Do not use side mounted boxes or brackets.

3.02 INSTALLATION

- A. Install flush mounted boxes, after being equipped with extensions, accessories, etc., flush with finished face of wall, ceiling or floor.
 - 1. Replace or repair all boxes not installed flush with finished surfaces to the satisfaction of the Architect and/or Owner.
 - 2. In order to meet this requirement, it is recommended that the Electrical Contractor be present during installation of gypsum board, tile or other wall coverings and during installation of outlet boxes in masonry walls.
 - 3. Coordinate depth of wall coverings to be installed on all walls with the General Contractor prior to installing plaster rings.
- B. Install boxes in opposite sides of common room walls in adjacent stud spaces where possible and with minimum 6" separation between the boxes. Provide minimum 10" of conduit between boxes which are connected by conduit.
- C. Install outlet boxes for light switches on the strike side of door openings. Coordinate door swings with the General Contractor prior to roughing in switch boxes.
- D. Install boxes in masonry walls in the cell of the block or behind brick with deep masonry ring to extend flush with the finished wall surface.
- E. Seal around the surface of all switch and outlet boxes with plaster or grout to close any opening between the outlet box and the wall finish.
- F. Install boxes level and plumb.

3.03 LOCATIONS

- A. The wiring system layouts on the drawings are generally diagrammatic and the location of outlets and equipment are approximate.
- B. Study all available drawing details, shop drawings, equipment drawings, building conditions and

materials surrounding each outlet and device box prior to installing the box to ascertain the exact location required for each box.

- C. Rough in the electrical work such that electrical outlets, fixtures and other fittings are properly fitted to the work of other trades.
- D. Do not install boxes inside cupboards, behind drawers, or otherwise so located, as to be inaccessible or unsuited for the purpose intended.
- E. The right is reserved to make any reasonable change in the location of the outlets before roughing in, without involving additional expense.

3.04 MOUNTING HEIGHT

- A. Install outlet and device boxes at the heights shown on the drawings or as directed by the Architect. In general, mount outlets as follows.
 - 1. Convenience Outlet 18"
 - 2. Wall Switch 46"
- B. All mounting heights, including mounting heights indicated on drawings, are to the center of the outlet box above finished floor or grade unless noted otherwise.
- C. Install outlets above counters 4" above the top of the counter backsplash to the center of the outlet. Coordinate mounting heights with the cabinet installer prior to roughing in the outlets.
- D. Refer to applicable Specification Sections for mounting heights of devices and equipment not included above or install at heights as directed by the Architect and/or Engineer.

* END OF SECTION 16130 *

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SECTION 16190 - SUPPORTING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

- A. Provide suitable supporting devices for all electrical equipment, raceways and components as specified herein and as shown on the drawings.
- B. Refer to individual specification sections for additional supporting requirements.

PART 2 - PRODUCTS

2.01 SUPPORTING DEVICES

- A. Provide support anchors which will support in tension a minimum of 4 times the weight of the equipment to be supported but not less 100 lbs.
- B. Provide wood screws in wood; toggle bolts in hollow masonry units; expansion bolts with lead shield or shot anchors in concrete and brick; and machine screws, threaded 'C' clamps or spring-tension clamps on steel work.
- C. Do not use tie wire for support unless specifically called for in individual specification sections.
- D. Do not use threaded C Clamps on tapered steel sections.
- E. Do not weld supports, equipment, boxes, raceways, etc., to steel structures.
- F. Do not use wooden plug inserts as a base for supports.
- G. Do not use shot anchors or drilled anchors of any kind in prestressed or post-tensioned concrete slabs and beams except as approved in writing by the Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Secure supporting devices to building structure.
- B. Do not install supporting devices with sheetrock or plaster as the sole means of support. Provide proper blocking behind the sheetrock or plaster as required to support equipment.

* END OF SECTION 16190 *

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SECTION 16195 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

- A. Provide identification of all electrical equipment, devices, enclosures, conductors, cables, etc., as shown on the drawings and as specified herein.
- B. Refer to individual specification sections for additional identification requirements.

PART 2 - PRODUCTS

2.01 NAMEPLATES

- A. Provide engraved laminated micarta or plastic nameplates to identify each panelboard, cabinet, motor starter, disconnect, etc., with the following minimum lettering heights:
 - 1. Switchboards, panelboards, etc. - 3/8"
 - 2. Disconnects, motor starters, etc. - 1/4"
 - 3. Time switches, lighting contactors, etc. - 3/16"
- B. Provide Black Nameplates with White Lettering unless noted otherwise, or required to contrast with equipment enclosures.
- C. Do not use Dynamo Labels, printed labels, etc., unless specifically called for in other specification sections or approved by the Architect and/or Engineer.

2.02 EQUIPMENT IDENTIFICATION

- A. Provide engraved nameplates on the exterior of each Motor Starter, Safety Switch, etc., to include the Equipment Description, Number or Designation, Voltage, Motor Horsepower and/or Full Load Amps and the Circuit from which the equipment is served.
 - 1. Example: AIR HANDLER AH-2
 10 HP, 480 VOLT, 3Ø
 CIRCUIT MCC1-2B
- B. Provide engraved nameplates on the exterior of feeder and other major junction boxes and pull boxes to indicate the function of the wiring within the box such as "PANEL 'A' FEEDER" or "FIRE ALARM PULLBOX".

2.03 PANELBOARD IDENTIFICATION

- A. Provide one engraved nameplate on the exterior trim of each Panelboard, visible without opening the door, to include the Panel Designation and the System Voltage.
 - 1. Example: PANEL 'A'
 120/208 V, 3Ø
- B. Provide a second engraved nameplate on the interior deadfront cover of each Panelboard to include the Panel Designation, the Distribution Panel serving the panelboard and the location of the Distribution Panel.
 - 1. Example: PANEL 'A'
 MAIN IN 'LDP1'
 MAIN ELECT. ROOM

- C. Provide nameplates on each Branch Breaker of Distribution Panelboards to indicate the Panel or Equipment served by the Branch Breaker and the location of the Panel or Equipment.
 - 1. Example: PANEL 'A'
 MAIN FLOOR SOUTH CORRIDOR
 - 2. Install the branch breaker nameplates on the wireway cover trim of panelboards. Do not install the nameplates on interchangeable dead-front trims.

2.04 CONDUCTOR IDENTIFICATION

- A. Identify each branch circuit and each feeder conductor at each outlet box, pull box or other accessible location with hand lettering in black India ink in the enclosure to indicate panel and circuit numbers of all conductors in the enclosure.
- B. Identify individual conductors in each outlet box, pull box or other accessible location according to the circuit number with self adhesive printed markers equal to Thomas & Betts "E-Z Code" markers.

2.05 PANELBOARD CIRCUIT INDEX

- A. Provide a neatly typed index, to include type of load served and the specific location of the load for each branch circuit of each panelboard.
- B. Provide a new neatly typed index to include type of load served and the specific location of the load for each branch circuit of each existing panelboard in which branch circuits are added and/or deleted to reflect the changes in circuiting.
 - 1. Use italic text for circuits identified using existing index. Use normal text for new circuits and indicate project date as part of description.
 - 2. Where existing panelboards are without indexes, provided new neatly typed index. Indicate circuits that are identified in the course of work.
- C. Examples
 - 1. *Lighting - Conference*
 - 2. Lighting - Office (12/2005)
 - 3. *Outlets - Clerical*
- D. Do not use room numbers shown on plans, use room numbers or nomenclature assigned to rooms by the Owner. Do not use remarks from panel schedules on drawing, the remarks are for the Contractor's reference only.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install nameplates to be visible from normal viewing angles.
- B. Attach nameplates to equipment enclosures with stainless steel screws or rivets. Adhesives are not acceptable.
- C. Install panel index behind protective plastic covering.

* END OF SECTION 16195 *

SECTION 16400 - SECONDARY SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.
- B. Section 16110 - Raceways
- C. Section 16120 - Conductors

PART 2 - PRODUCTS

2.01 SYSTEM

- A. The Existing Secondary Electrical Distribution System is 120/208 Volt, Three Phase, Four Wire, 60 Cycle for Lighting, Equipment, Appliances and Outlets.

PART 3 - EXECUTION

3.01 FEEDERS

- A. Before or during final job site observation, check each panel feeder and main feeder for balance of load on each phase, and make necessary adjustments to insure acceptable balance.

3.02 POWER OUTAGES

- A. Power outages to any portion of the existing building will not be allowed except on weekends, holidays and/or as directed by the Owner.
 - 1. Submit written requests for power outages to the Owner not less than Seven (7) working days prior to all proposed outages.
 - 2. Do not take any power outages without the Owners permission.

* END OF SECTION 16400 *

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SECTION 16450 - SECONDARY GROUNDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

- A. Ground all non-current carrying metallic parts of electrical equipment, raceway systems and the neutral conductor of the wiring system as shown on the drawings and specified herein.

PART 2 - PRODUCTS

2.01 GROUND CONDUCTORS

- A. Provide copper ground conductors, minimum No. 8 AWG solid. Stranded conductors may be used for sizes No. 2 AWG and larger.

2.02 GROUND CONNECTIONS

- A. Make ground connections to the existing building ground system and extend to new electrical equipment, raceways, outlets, lighting, etc..
- B. Bond the neutral conductor to electrical service ground system at the main transformer and the main service equipment only.
- C. Bond all interior metallic piping systems to the electrical service ground system.
- D. Make above ground connections by means of pressure connectors, compression connectors, clamps or other means which are UL Listed and classified as suitable for purpose.
- E. Make all underground connections by means of an exothermic welding process equal to Cadweld or Thermoweld, in strict accordance with manufacturer's written instructions and recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Leave ground connections accessible for inspection.
- B. Connect grounding conductors for grounding receptacles, etc., to a ground terminal in the panelboard. Provide a separate ground terminal for each grounding conductor as it is brought into the panelboard.
- C. Install all grounding in accordance with the latest edition of the National Electrical Code.

* END OF SECTION 16450 *

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SECTION 16470 - PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.02 SCOPE

- A. Provide new branch circuit breakers in existing panelboards to serve new branch circuits as shown on drawings.

PART 2 - PRODUCTS

2.01 CIRCUIT BREAKERS

- A. Provide thermal-magnetic type circuit breakers unless noted otherwise.
- B. Provide multi-pole breakers with trip elements in each pole and common trip handle.
- C. Provide "HACR" rated circuit breakers to serve heating, ventilating and air conditioning equipment branch circuits.
- D. Provide "SWD" rated circuit breakers to serve all lighting and outlet branch circuits.
- E. Provide new circuit breakers in existing panelboards of the same type and interrupting ratings as the existing circuit breakers. Provide new mounting hardware, connectors, dead front covers, etc., as required to install the new circuit breakers.
- F. Plug-in breakers are not acceptable.

2.02 INTERRUPTING RATING

- A. The interrupting rating of circuit breakers shall be at least equal to the available short circuit current at the line terminals of the circuit breaker and correspond to the UL listed integrated short circuit current rating specified for the panelboards.
- B. The minimum interrupting ratings of circuit breakers used as feeders and branches may be in accordance with UL 489 tested and certified series-connected circuit breaker combinations. All electrical equipment using the Series Rated circuit breaker combinations shall be clearly marked on the panel nameplate and feeder breaker indicating the same.

2.03 ACCEPTABLE MANUFACTURERS

- A. Square 'D', to match existing.

PART 3 - EXECUTION

3.01 IDENTIFICATION

- A. Provide nameplates and neatly typed circuit index for each panelboard in accordance with Section 16195 - Electrical Identification.

* END OF SECTION 16470 *

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SECTION - 16850 SNOW MELTING HEAT CABLE SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 1 Specification Sections and Section 16000 - General Provisions, Electrical apply to work of this section.

1.2 SCOPE

- A. Provide a complete snow melting heat cable system and controls in roof gutters, downspouts and roof valleys as shown on drawings and as specified herein.

1.3 SUBMITTALS

- A. Provide submittals for the Snow Melting Heat Cable System in accordance with division 1 Specifications and Section 16000 - General Provisions, Electrical to verify compliance with the referenced standards and the Contract Documents.

PART 2 - PRODUCTS

2.1 APPROVALS

- A. The heating cable system, including controls, connectors, terminations, splices, and attachment to roof shall be UL listed for use as a roof and gutter de-icing system.

2.2 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers, subject to compliance with contract documents, are:
 - 1. Bylin Engineered Systems
 - 2. Chromalox
 - 3. Disco Associates
 - 4. Easy Heat
 - 5. Raychem
 - 6. Technitrac

2.3 SNOW MELT HEAT CABLE

- A. The cable heater shall be of the Self-Regulating type consisting of two (2) 16 gauge stranded tinned copper or nickel coated copper bus wires embedded in parallel in a self-regulating polymer core that varies its electrical resistance to respond to temperature all along its length and which will allow the cable to be field cut to any length.
- B. The heater shall be insulated with a thermoplastic or polyolefin jacket rated for 150°F (65°C).
- C. A tinned copper braid with a UV Stabilized thermoplastic or polyolefin jacket shall be applied over the completed heater assembly.
- D. Provide cable with cold leads for connection to power supply.
- E. Cable shall be rated for 5 watts per lineal foot at an ambient temperature of 50 degrees F (10 degrees C) when operated at 208 volt, single phase. Cable at 208 volt and 0°F starting temperature shall have the maximum cable length exceeding 400 feet on a 30 amp breaker.
- F. All heat cable splices, taps and terminations shall be made as recommended by the cable manufacturer using only splice and termination kits supplied by the manufacturer.

2.4 AUTOMATIC CONTROLLER

- A. Provide an automatic controller, equal to Environmental Technology Inc. Model GIT-4, to control snow melt heat cable as shown on the drawings, complete with temperature/moisture sensor, internal equipment ground fault protection with field selectable trip level, 26 ampere contacts, and remote control unit capable of overriding sensor, testing and resetting ground fault trip, and to display status of the controller.

2.5 DISCONNECTING MEANS

- A. Provide a disconnecting means for each heat cable circuit in accordance with National Electrical Code Article 426-50.

2.6 CAUTION SIGNS

- A. Provide Caution Signs stating "CAUTION - ELECTRIC TRACED" on outside of each downspout which is equipped with heat cable and at locations on the roof where roof gutter is accessible.
- B. Signs shall be equal to Thomas & Betts self-adhesive WDA Vinyl markers with minimum 1/2" high yellow lettering on black background.

2.7 DOWNSPOUT HANGER

- A. Provide downspout hanger, equal to Disco Associates type SLT-D, to support snow melt heat cable at top of downspouts. Hanger shall as a minimum have hanger wire, cable clamp(s) and protective tubing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install controls, sensors and heat cable complete with all necessary mounting brackets, control wiring, etc., in accordance with manufacturer's written instructions and recommendations and in accordance with National Electrical Code Article 426.
- B. Install heat cable continuous from controller without splices or tees. Loop heat cable in downspouts and roof valleys as required to maintain continuous run.
- C. Heat cable terminations shall extended to above gutter away from water troff of gutter as necessary new minimize submersion in water.

3.2 SUPPORTS

- A. Secure heat cable in roof gutters to the bottom of the gutter with 6 inch strips of coated aluminum adhesive tape spaced not farther than 2 feet on center.
- B. Secure heat cable in downspouts at the top of the downspout with a suitable hanger. Extend cable into storm drain piping at the bottom of the downspout to below frost line (30"). Coordinate requirements with gutter system contractor and storm drain piping contractor. Install hanger with anchor located as high as possible in gutter and seal penetration per Joint Sealant Specification Section 07920, coordinate with gutter contractor.
- C. Secure heat cable in roof valleys with 6 inch strips of coated aluminum adhesive tape spaced not farther than 2 feet on center. Secure heat cable at the top of the valleys with a down spout hanger. Coordinate requirements and installation with roofing contractor.
- D. Install supporting devices in a manner that will not cause leaks in the roof or gutter system.

* END OF SECTION 16850 *